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Bibliography on Cosmic Rays in the Atmosphere (–1952), p. 361

Vol. 7 March 1956 No. 3

# METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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# METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 7 MARCH, 1956 No. 3

## SPECIAL FEATURE IN THIS ISSUE

An Annotated Bibliography on Cosmic Rays in the Atmosphere

by

Mary L. Rice and Geza Thuronyi

(*For complete table of contents see back cover*)

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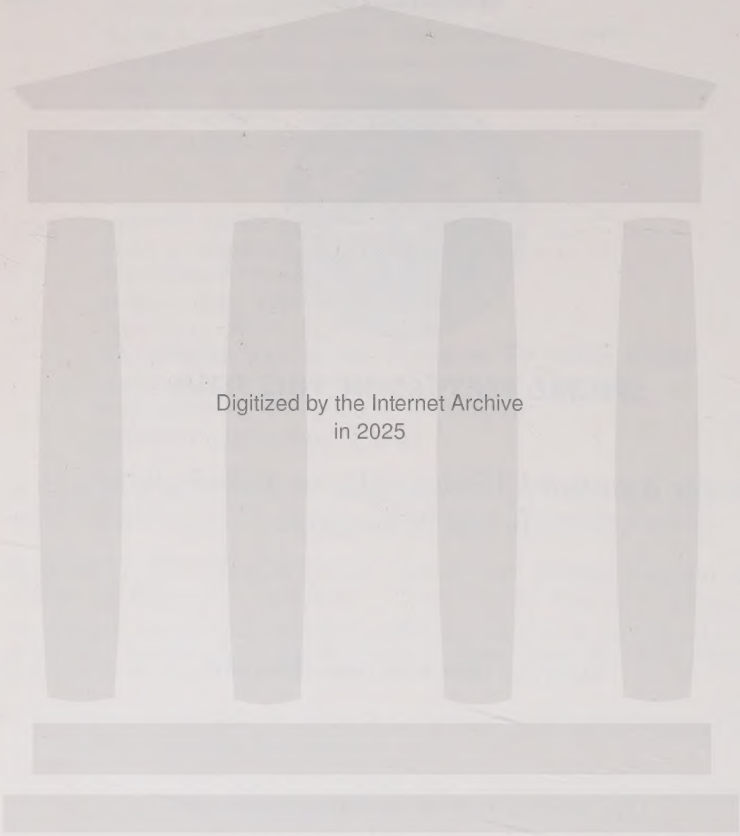

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# FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to ing to the attention of meteorologists current literature in their field and in related fields and provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, ., arranged according to the Universal Decimal Classification.

Part II of each issue comprises a special annotated bibliography of important references a special subject. No attempt is made to prepare exhaustive bibliographies; instead, the n is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

| | | | |
|---|---|---|---|
| Atmos. Pollution | 2. Aerobiology | 3. Cloud Physics | 4. Hail |
| Tornadoes | 6. Volcanic Dust | 7. Climat. Changes | 8. Thunderstorms |
| Icing | 10. Acoust. Propagation | 11. Evaporation | |

Vol. II, 1951

| | | | |
|---|---|---|---|
| Extended Forecast. | 2. Long Range Forecast. | 3. Soil Temp. | 4. Constants, etc. |
| Clim. of Near East | 6. Clim. of Middle East | 7. Special Winds | 8. Radar Storm Detect. |
| Condensation Trails | 10. Clim. of N.E. Africa | 11. Mountain Met. | |

Vol. III, 1952

| | | | |
|---|---|---|---|
| Clim. of N.W. Africa | 2. Carbon Dioxide | 3. Clim. of Argentina, etc. | 4. Dew |
| Objective Forecast. | 6. Stratus Forecast. | 7. Urban Climatology | 8. Clim. of C. Africa |
| Visibility | 10. Glaze and Rime | 11. Free Air Turbulence | |

Vol. IV, 1953

| | | | |
|---|---|---|---|
| Turbulence Theory | 2. Turbulent Diffusion | 3. Frost | 4. Clim. of Australia, etc. |
| High Level Winds | 6. Winds in Stratosphere | 7. Jet Stream | 8. Radiation Bioclim. |
| Clim. of Pacific | 10. Auroras | 11. Sferics | |

Vol. V, 1954

| | | | |
|---|---|---|---|
| Oceanog. Met. | 2. Clim. of S.E. Asia | 3. Auroral Physics | 4. Tropopause |
| Balloons | 6. Numerical Forecast. | 7. Radiation Data | 8. Vertical Motion |
| Clim. of Arctic | 10. Industrial Met. | 11. Wind Waves and Swell | |

Vol. VI, 1955

| | | |
|---|---|---|
| . Bibliog. of Bibliog. | 2. Texts & Monogr. Bibliogs. | 3. Storm Surges |
| . Ionospheric Prop. | 5. Photochem.—Upper Atmos. | 6. Cloud Physics |
| . Radar Cloud Physics | 8. Atmos. Nuclei (1841–1950) | 9. Atmos. Nuclei (1951–1955) |
| . Weather Modification | 11. Cooling Power | |

Bibliographies published this year are:

. **Synoptic Meteorology of the Arctic**, Vol. 7, No. 1, Jan. 1956
. **Climate of Enclosed Spaces**, Vol. 7, No. 2, Feb. 1956
. **Cosmic Rays in the Atmosphere** (–1952), Vol. 7, No. 3, March 1956

Forthcoming bibliographies will be:

. **Cosmic Rays in the Atmosphere** (1953–1955), Vol. 7, No. 4, April 1956
. **Atmospheric Radioactivity**, Vol. 7, No. 5, May 1956
. **Tropospheric Inversions**, Vol. 7, No. 6, June 1956

Other bibliographies in preparation are:

*Actinometers*
*Climate of the Arctic*
*Fog Forecasting*
*Microwave Propagation*
*Night Airglow*
*Ozone*
*Singularities*
*Snow Cover*
*Synoptic Aerology*
*Tropical Cyclones*

Part III contains a listing of the contents of those journals which are primarily meteorogical. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. In the December issue mulative author, subject, geographical and journal indexes are published.

# EXPLANATIONS

**Location of material:** For each entry, a symbol is given for at least one library where th material may be found. The Union List of Serials (Gregory) is the source of most of th symbols used. In some cases, where no symbol has been assigned to a library, one will b devised according to the principles of the Union List.

**Library symbols** used frequently may be found in the following list:

| | |
|---|---|
| **DA:** | U. S. Dept. of Agriculture Library, Washington, D. C. |
| **DBS:** | U. S. Bureau of Standards Library, Washington, D. C. |
| **DGS:** | U. S. Geological Survey Library, Washington, D. C. |
| **DLC:** | Library of Congress, Washington, D. C. |
| **DN-HO:** | U. S. Navy Hydrographic Office Library, Suitland, Md. |
| **DSG:** | U. S. Army Medical Library, Washington, D. C. |
| **DSI:** | Smithsonian Institution Library, Washington, D. C. |
| **DWB:** | U. S. Weather Bureau Library, Washington, D. C. |
| **GB-MO:** | Great Britain, Meteorological Office Library, Harrow, England. |
| **MH-BH:** | Harvard University, Blue Hill Observatory Library, Milton, Mass. |

**Other symbols:**

| | |
|---|---|
| * | before an entry indicates a good data source. |
| † | before an entry indicates a good bibliography. |
| § | before an entry indicates a synoptic case history study accompanied by chart |

**Geographic locations** are in the English form rather than the form used locally, for exampl Moscow for Moskva.

**Titles of articles or monographs** are in the language of the original article unless otherwi stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to th Library of Congress transliteration scheme.

**Abbreviations:**

*Titles of periodicals* are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months a abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Numb (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus a entry will read as follows:

*Meteorologische Rundschau*, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (V 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

# PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

## MAJOR, GENERAL AND SPECIAL

### COLLECTED WORKS

7.3–1 551.311.12:91.04(988) 551.506.5(988)

†U. S. Arctic, Desert and Tropic Information Center, **Project Mint Julep (Investigation of nooth ice areas of the Greenland Ice Cap, 1953).** Its *ADTIC Publication* A–104a and –104b, May **1955.** 2 v. Pt. 1, **Introduction, narrative and general reports.** 82 p. figs. ome fold.), photos. Includes Hendrickson, Karl N. and Hudgins, Ronald C., **Meteorology,** 68–73. Pt. 2, **Special scientific reports.** 100 p. figs. (some fold.), photos, tables, bibliogs. roughout. Contents of Pt. 2: Holmes, G. William, **Morphology and hydrology of the Mint ılep Area, Southwest Greenland,** p. 1–50. 22 figs. (some fold.), 8 photos, 2 tables, 26 refs. ıChapelle, Edward, **Ablation studies in the Mint Julep Area, Southwest Greenland,** p. 51–72. fig., 2 tables, 13 refs. Wilson, L. R., **Minor surface features of Southwest Greenland Ice ıp,** p. 73–93. 26 photos, table, 11 refs. Wilson, L. R., **Snow and ice residues: cryoconite,** 94–100. 3 fig., 7 refs. **DWB**—A complete account of the Project Mint Julep Expedition the Greenland Ice Cap with material on personnel, equipment, communications, field ɔerations, aerial reconnaissance, studies of morphology, hydrology, minor surface features, ılation, snow profile, etc. accompanied by elaborate charts and illustrations and a number of ientific papers as listed above. The meteorology and observational program is discussed on 68–73, and includes a weekly synopsis of weather from May 26 to Aug. 15, 1953, as recorded the observers on duty, and a list of all items of meteorological equipment, wind roses and anscript of automatic records. In Pt. II, p. 51–72, ablation studies are discussed. The easurement of ablation, duration and character of ablation season, annual snow accumulation, et ablation and accumulation, evaporation, the firn limit, albedo, variation of ablation with titude, etc. are treated. Quantitative data are given on charts, graphs and in tables. *Subject eadings:* **1. Glacier expeditions 2. Project Mint Julep 3. Albedo of glaciers 4. Greenland e Cap 5. Glacial ablation 6. Greenland.**—*M.R.*

7.3–2 551.506.5(988)

*[Shaw, Donald], **Project Mint Julep.** *Air University Quarterly Review,* Maxwell Air ɔrce Base, Alabama, 7(3):96–105, Winter **1954/1955.** photos. **DLC**—Expedition "Mint ılep" by Air Force Arctic, Desert and Tropic Institution, under direction of Lt. Donald ıaw, left Maxwell Air Force Base, Alabama on May 7, 1953 and arrived at Sondrestrom ord Air Base, Greenland on May 11 and then were flown in ski-equipped C-47 to Icecap at ɔint where smoothest ice zone was found in 1947 by Shaw. Good weather instead of expected gh winds, low temperatures and snow drifts were experienced from May 14–Aug. 21. For weeks in June and July weather was continuously clear. Above freezing temperature in ternoon and temperature >10°F at night was the rule. Highest temperature was 43°F. ain fell on 2 occasions. Meteorological data useful for future forecasting, as well as snow, e and topographical data were obtained. *Subject Headings:* **1. Greenland Expedition, 1953 Project Mint Julep 3. Meteorological data 4. Greenland Ice Cap 5. Greenland.**—*M.R.*

7.3–3 551.510.42:551.506(794)

†*Renzetti, N. A. and Marcus, Helen G., **Aerometric survey of the Los Angeles Basin, ıg.–Nov. 1954.** *Air Pollution Foundation, Los Angeles, Report,* 1(9), July 1, **1955.** 333 p. ;s., tables, refs. throughout. **DWB**—This, the most voluminous of the reports of the Los ıgeles Air Pollution Foundation, contains 10 technical papers on various aspects of the

aerometric survey by 15 different authors. Among conclusions reached by the intensive sampling and analysis program conducted at 10 stations in the Los Angeles Basin during the 4 months smog season from Aug. 1–Nov. 30, 1954 are: 1) incinerators contribute markedly toward smog; 2) photochemical reactions are important; 3) sources of smog are not local but are widespread throughout Basin; 4) oxidant incidence is closely correlated with human activity with respect to time of day and with smog incidence; 5) smog reduces solar radiation in downtown Los Angeles by 10%; 6) concentration of contamination increases as the inversion height decreases; 7) oxidants and aldehydes are produced by photochemical reactions between hydrocarbons and oxides of nitrogen under the influence of sunlight; 8) eye irritation occurs on 69% of the days sampled (29 days); 9) severity of eye irritation increases as oxidant increases above 10 pphm., and as hourly values of particulate matter increase; 10) isooxidant and iso-eyeirritation lines conform to topography and 11) measurement of oxidant concentration gives the most reliable indication of smog severity. Status of knowledge in spring of 1954 is reviewed in Ch. I; Stations and equipment illustrated and described in Ch. II along with meteorological equipment and observation program; Schedule of measurements at ground and aloft in Ch. III; Measurement of eye irritation in Ch. IV; Studies in plant response in Ch. V; Data reduction techniques in Ch. VI; Interpretation of results (by M. NEIBURGER, N. A. RENZETTI, L. H. ROGERS and R. TICE) in terms of space and time concentrations of various pollutants, etc. with numerous charts and graphs in Ch. VII; Nature of the suspended matter in Ch. VIII; Statistical analysis of aerometric survey data by E. J. WIGGINS in Ch. IX with voluminous tables; and Instrument development by N. A. RENZETTI in Ch. X. Abstracts of individual articles will be published separately in *MAB*. *Subject Headings:* **1. Atmospheric pollution studies 2. Smog 3. Medical meteorology 4. Los Angeles, Calif.**—*M.R.*

7.3–4 551.579:63

†U. S. Dept. of Agriculture, **Water: the Yearbook of Agriculture, 1955.** Wash., D. C., Govt. Print. Off., **1955.** 751 p. figs., tables and bibliogs. throughout. General bibliog. p. 722–723. **DA, DLC**—This yearbook is devoted to a survey of the properties, behavior and conservation of water. The emphasis is upon the role of water in the various aspects of agriculture. The subjects treated are as follows: the needs and use of water by plants, animals and man; the source of water including the water cycle, waters in rivers and oceans, artificial precipitation, fog, mist and dew, precipitation variations, etc.; the interaction of water and soil; the relationship between water and forests; the use of water in irrigation; the role of water in crop production; water and ranges and pastures; drainage of fields; the relationship between water and wild life; and legislative regulations of water use; water conservation, etc. The volume contains numerous diagrams and photographs, quantitative data and bibliographic citations. The contents of this volume are listed in *MAB*, 6(11):1651, Nov. 1955. *Subject Headings:* **1. Agricultural hydrology 2. Water resources.**—*I.L.D.*

## TEXTBOOKS

*See also:* **Meteor astronomy** (Lovell) 7.3–18; **Pilot's weather handbook** (Lee Reber) 7.3–69; **Compendium of agromet.** (Japanese Agromet. Soc.), 7.3–79.

7.3–5 551.5:92 551.5(09)

Abbe, Truman, **Professor Abbe and the isobars: the story of Cleveland Abbe, America's first weatherman.** N. Y., Vantage Press, **1955.** 259 p. illus. (incl. photos and ports). **DLC**—The present generation of meteorologists have all heard the name of CLEVELAND ABBE but are unaware of his tremendous scientific stature. He was an astronomer trained in the U. S. A. and at Pulkovo, Russia in the 1860's; director of the Cincinnati Observatory in 1869, where he made the first regular daily synoptic weather charts; professor of meteorology at the U.S.W.B. from 1870 (Signal Corps) until his death in 1916; editor of the *Monthly Weather Review* at the time of its greatest fame; editor of the *Bulletin of the Mount Weather Observatory* during its brief life; pioneer in many fields of theoretical and practical meteorology and climatology; writer of the first textbooks on meteorological instruments and on agricultural meteorology; promoter of the first comprehensive *International Meteorological Bibliography*

from 1880–1891 (it was never published in full and reproduced only by cheap offset for a few parts); writer of hundreds of papers on various aspects of meteorology and friend of all of the great "universalists" in meteorology and of many in other sciences in the heyday of universalists, and the man affectionately known all over America at the early age of 32 as "Old Probs" because he issued the first forecasts in terms of probabilities. Scientific facts and personal letters, diaries and events are woven into an unusually readable biography by his son—not himself a writer like his brother, Cleveland Abbe, Jr. or his father, but a scientific medical man famous in his own right for having introduced into America the treatment of cancer by radium. The experiences of CLEVELAND ABBE during his year or so in Russia at the Pulkovo Observatory where he rubbed elbows with the great astronomers and meteorologists of Europe and received the inspiration for many of his later achievements, his difficulties there and later with the military minded in the Signal Corps and Weather Bureau, his modesty, patience, kindness, unselfish devotion to science, objectivity, resourcefulness or initiative are all brought out in this narrative along with the usual account of his home and social life in Washington, D. C., his hobbies, his expeditions to Africa, South Atlantic Islands and the Caribbean, and his teaching career at Baltimore and comprehensive meteorological library donated to Johns Hopkins University. He never became Chief of the U.S.W.B. or U.S.S.C. but will be remembered long after many of the chiefs are forgotten. *Subject Headings:* **1. Biography of Cleveland Abbe 2. History of U. S. Weather Bureau 3. Abbe, Cleveland 4. U. S. Signal Corps.**—*M.R.*

7.3–6 551.5(02)

Ludlam, Frank Henry and Scorer, Robert S., **Further outlook. With an introd. by Sir David Brunt.** London, Allan Wingate, **1954.** 174 p. 25 figs., 12 plates (photos). **DWB**—A new book about the weather for the layman, written from the point of view of research scientists and forecasters who are working in the frontier regions where success is not invariable and where genius or art is often as important as science. The book takes up, with almost no mathematics but with a great deal of philosophizing, the thermodynamic, convective and turbulent processes in the atmosphere, measurement or observation of these processes or elements affected by them; practical use of these elements (soaring, wind power, etc.); the *art* of forecasting and hopes for improvement; the *science* of forecasting; equations of motion, convection, models, machine methods, extrapolation normals; weather control (microclimatic, smoke, fog, agriculture, cloud seeding) and, finally, *uncertainties:* objective methods, statistical tests for success in forecasting or rainmaking, long range forecasting, etc. (*Same item as* 6J–248, Oct. 1955, *MAB.*) *Subject Headings:* **1. Meteorology textbooks 2. Popular science books 3. Artificial precipitation.**—*M.R.*

7.3–7 551.501.4:551.509.31(02)

Saucier, Walter J. (*Dept. Oceanog., Texas A. & M. College*), **Principles of meteorological analysis.** Chicago, Univ. of Chicago Press, **1955.** 438 p. numerous figs., tables, eqs. Refs. at end of each chapter. **DLC**—A highly specialized and useful technical textbook for the benefit of those who have had basic courses in dynamic meteorology and climatology and who wish to study (or teach) practical synoptic analysis. The book developed from a course in analysis given at the Univ. of Chicago, but brought up to date and reorganized to fit the latest concepts in synoptics and dynamics. A chapter (p. 1–16) is devoted to a definition of the standard parameters and a representation on Northern Hemisphere charts of the mean state of the upper atmosphere in Jan. and July. Ch. 2 describes and illustrates all manner of charts and diagrams for synoptic, dynamic and aerological purposes. Ch. 3 goes into hydrostatic and static stability, Ch. 4, scalar analysis, Ch. 5, graphical analysis (addition, subtraction, multiplication, differentiation, etc.), Ch. 6, cross section analysis, Ch. 7, isobaric analysis, Ch. 8, isentropic analysis, Ch. 9, surface, frontal and isallobaric charts, Ch. 10, kinematic analysis, Ch. 11, broad scale, Ch. 12 local analysis (vertical time sections, hodographs, etc.) and Ch. 13, tropical analysis. A marked cold front situation (over the Atlantic States) with strong NW flow over most of North America is used as an example and illustrated by charts for March 1, 1950 throughout the text. References are inserted at the end of nearly every section. The outline of sub-sections of the 13 chapters is very detailed (240 headings)

and makes it easy to find material in any aspect of this complicated and therefore ill-defined field. Review by David K. Todd in *Science*, 123(3188):187–188, Feb. 3, **1956.** *Subject Headings:* **1. Meteorological analysis textbooks 2. Synoptic analysis 3. Aerological analysis 4. Isentropic analysis 5. Tropopause analysis 6. Tropical analysis 7. Textbooks.**—*M.R.*

7.3–8 91(02) 551.5:378

Horrocks, N. K. (*Central Grammar School, Manchester, Eng.*), **Physical geography and climatology. Foreword by S. W. Wooldridge.** London, Longmans, Green, **1953.** 368 p. 257 figs. (incl. photos), tables. **DWB**—This is an up-to-date book of the old-fashioned-type written to convery comprehensive and concrete information about the physical geography of the earth to high school seniors preparing for the university (VI form in England). Many have complained, and with reason, that students of science in the universities are woefully ignorant of the rudiments of physical geography (though acquainted with regional geography according to the latest trends in teaching). The material herein, while not going into mathematical aspects of geology-geography or meteorology, presents the physical facts in diagrammatic or schematic form so the processes can be visualized in a quantitative manner. The first part of the book deals with the structure of the Earth's surface, Pt. II with Earth sculpture (water, ice, wind, karst and wave or current erosion), Pt. III with elementary meteorology, Pt. IV with vegetation and soils, Pt. V with climatology (regional based on climatic classification), and Pt. VI with oceanography. *Subject Headings:* **1. Physical geography textbooks 2. Elementary climatology 3. Teaching of meteorology.**—*M.R.*

7.3–9 681.14:(02)

†Booth, Andrew D. (*Univ. of London*), **Numerical methods.** N. Y., Academic Press, **1955.** 195 p. figs., bibliogs. and eqs. throughout. "Select bibliog" p. 189–190. Price: $6.00. **DLC.** Review by F. H. Bushby in *Royal Meteorological Society, Quarterly Journal*, 81(350):649. Oct. **1955. DWB**—A handy text or reference work for anyone interested in programming data for an automatic digital calculator where ordinary hand methods of computation are inadequate. The separate chapters take up: 1) numerical analysis, 2) tabulation and differences, 3) interpolation, 4) numerical differentiation and integration, 5) summation of series, 6) solution of differential equations, 7) simultaneous linear equations, 8) partial differential equations, 9) nonlinear algebraic equations, 10) approximating functions, 11) Fourier synthesis and analysis and 12) integral equations. The bibliography lists the best works up to 1954 in each field, including programming and electronic calculators; there is an author and a subject index. Most of the material can be found in other texts, but not in so condensed a form suitable for undergraduates. *Subject Headings:* **1. Numerical analysis 2. Automatic computation methods 3. Textbooks.**—*M.R.*

## MONOGRAPHS

*See also:* **Physical geography & climatology** (Horrocks) 7.3–8; **Oceanic & continental vegetational complexes** (Böcher) 7.3–249.

7.3–10 551.515.2

Willett, Hurd C., **Study of the tropical hurricane along the Atlantic and Gulf Coasts of the United States.** N. Y., Inter-Regional Insurance Conference, Oct. **1955.** 63 p. 7 figs. (1 fold.), table, 23 refs. **DWB**—A complete scientific and statistical study of the hurricane in the West Indies, Caribbean and Atlantic Coast States. First the hurricane is defined and described with respect to genesis, structure, intensity, movements, tracks, size, force, modification and destructiveness (winds and floods, ocean currents and heavy rainfall); then there is a detailed statistical analysis and interpretation of hurricane incidence (402 storms) for 1900–1954, by regions and sub-regions and intensity plus forecasts of expected activity for the next 5, 30 and 60 yrs, based on solar relationships and past statistical trends. For example, the average frequency along Atlantic and Gulf is $7\frac{1}{2}$ per year for 60 yrs. Frequency is expected to decrease sharply during next 5–10 yrs, then average quite low during 1960–1990, and remain low from 1990–2020 in the Mid and North Atlantic States. Similar

forecasts are given for Gulf. *Subject Headings:* **1. Hurricane statistics 2. Long range hurricane forecasts 3. Atlantic and Gulf States.**—*M.R.*

7.3–11 551.506.5:551.521.4:551.521.12(675,68.01)

*Herrinck, P., **Observations photométriques du ciel nocturne et observations de rayonnement solaire et de températures au plateau des Bianos (Congo Belge). Mission effectuée sous l'égide de l'I.R.S.A.C.** [Photometric observations of the night sky and solar radiation and temperature observations on the Bianos Plateau, Belgian Congo. Mission sponsored by the Institut pour la Recherche Scientifique en Afrique Centrale.] *Belgian Congo. Service Météorologique, Publication*, No. 2, **1953.** 53 p. 8 figs., 8 photos, tables, 15+18 refs. **DWB.** Reprint from *Belgium. Institut Royal Colonial Belge, Section des Sciences Naturelles et Médicales, Mémoires* (in 8°), 23(2), **1953. DLC**—This report consists of 2 memoirs by the author, one on the photometric observations of the night airglow (Roach photometer) in the Belgian Congo at Biano Katanga (long. 26°07½′ and lat. 10°12′S, $h=1600$ M) and at Panfontein (long. 26°50′E, lat. 25°56′S) near Kaster in the Union of South Africa (with heights of 50–55 km for oxygen and 220 ±50 km for Na 5893 doublet) during May, June and July 1950. The second is on 5 months (Jan.–June, 1950) of observations of solar radiation and temperature on the Plateau of Bianos in Katanga, using a Moll actinometer to measure global radiation, another with a shield for diffuse radiation and a Linke-Feussner solarimeter and all recorded on a Brown recorder. Temperature readings were made at 1 m, 20 cm and 1 cm under grass and 1 cm under the bare soil, and dry and wet bulb air temperature in a shelter. Rainfall and wind were also recorded. Three filters (quartz, yellow and red) were used in the solarimeter, alternated with no filter. Resistance thermometers were also used. Equipment and surroundings are clearly illustrated and data presented in tables and graphs. Theoretical and instrumental aspects are given full treatment. *Subject Headings:* **1. Night airglow observations 2. Solar radiation observations 3. Expeditionary microclimatic data 4. Bianos, Katanga, Belgian Congo 5. Panfontein, South Africa.**—*M.R.*

7.3–12 551.506.3(73/9)

Pinkett, Harold T.; Finneran, Helen T. and Davidson, Katherine H., **Climatological and hydrological records of the Weather Bureau.** *U. S. National Archives, Preliminary Inventories*, No. 38, **1952.** 76 p. "This list supplements **List of Climatological Records in the National Archives,** pub. **1942,** and brings it up to date." **DLC**—The original manuscript and autographic records, charts and adiabatic diagrams of the first order, second order, and hydrological stations of the U. S. Weather Bureau which have been stored in the National Archives, are listed by stations (alphabetically) with inclusive dates for each station, under the following categories: Monthly meteorological record (1893–1938); Cooperative observers record (form 1009) for >5000 stations, 1893–1938 (stations not listed); Automatic records of wind, rain and sunshine (1872–1942); Thermograph records (1888–1939); Barograph records (1887–1939); Hydrograph records (1903–33); Kite records (1898–1933); Pilot balloon records (1918–44); Airplane observations records (1925–39); Adiabatic charts (1930–42); Hydrologic rainfall records (1843–1914). Earlier (1819–1892) records of the Surgeon General's Office, the Smithsonian Institute and the U. S. Army Signal Corps were listed in the 1942 inventory. Collection totals about 40,000 volumes. *Subject Headings:* **1. Climatic records 2. Weather record collections 3. U. S. National Archives. I. U. S. Weather Bureau.**—*M.R.*

7.3–13 551.5:016

†Arakawa, Hidetoshi; Hayashi, Toyozi and Tsutsumi, Kei-ichiro, **Nihon-kisho-Shiryo-Mokuroku.** [List of meteorological data published in Japan.] Tokyo. Central Meteorological Observatory, **1943.** 457 p. In Japanese. **DLC**—Inventory of meteorological data sources published in Japan, e.g., Monthly Weather Reports, Annual Weather Reports, Synoptic Weather Charts and other special meteorological reports published by the Government Weather Service since its inauguration. Data sources can be traced back to 1876. As an appendix (p. 302–457), periodicals in which meteorological articles occasionally appear are listed. *Subject Headings:* **1. Meteorological publication lists 2. Meteorology bibliographies 3. Japanese bibliographies.**—*H. Arakawa.*

7.3–14 551.506:551.507.2(261

Le Floch, J., **Quelques proprietés de la zone de transition entre eau Arctique et eau Atlantique en Mer de Norvège.** [Some properties of the transition zone between the Arctic water and the Atlantic water in the Norwegian Sea.] *Bergen. Universitetet, Årbok, Naturvitenskapelig Rekke*, No. 3, **1953.** 45 p. 4+25 tables, 2 refs. English summary p. 37 **DWB**—A major monographic study of daily oceanographic data obtained at Ocean Weather Ship M in the Norwegian Sea (66°N, 2°E) since 1948. The exact distribution of "stations" in the 5° square during each month is tabulated to allow for consideration of the great horizontal and vertical variations that occur at this weather ship station which is located on the fluctuating edge of the Atlantic Current. Mean isotherms and isohalines are analyzed for Oct. 1948–Oct. 1950, showing variation with latitude, longitude, depth, season and year. Anomalies in the temperature/salinity ratio are then analyzed (graphically and in tables) the distribution of temperature along the 35.00% isohaline and seasonal variations in its position relative to the 3°C isotherm. Then the soundings of June 1951 and the temperature salinity, anomalies relative to surface salinity variations in June to July 1951 are analyzed. *Subject Headings:* **1. Oceanographic data analyses 2. Weather ship data 3. Ocean temperature/salinity analysis 4. Norwegian Sea.**—*M.R.*

7.3–15 551.573:627.1

*†Braslavskiĭ, A. P. and Vikulina, Z. A., **Normy isparenііa s poverkhnosti vodokhranilishch.** [Norms of evaporation from the surface of reservoirs.] Ed. by A. I. Chebotarev. Leningrad, Gidromet. Izd-vo, **1954.** 211 p. 24 figs., 94 tables (also p. 132–209), 77 refs., numerous eqs. At head of title: Ministerstvo sel'skogo khoziaĭstva SSSR. Glavnoe Upravlenie Gidrometeorologicheskoĭ Sluzhby. Gosudarstvennyĭ Gidrologicheskiĭ Institut. **DLC**—This outstanding monograph on methods for determining the amount of evaporation from the surface of water reservoirs summarizes the results of investigations which have been carried out by the State Hydrological Institute over a period of years. The regime of evaporation can now be calculated by taking into account the water balance, and the changing characteristics of the reservoir. Total evaporation from water reservoirs of medium size and 5 m depth is shown on a map covering European Russia and West Siberia. The work provides for an extensive use of the results in practical applications for designing and operating water reservoirs located on the plains of the U.S.S.R. The separate chapters discuss in detail: I. Empirical evaporation formula, II. Wind speed, III. Humidity and temperature of air, IV. Water temperature, V. Accuracy of calculations of evaporation by formula, VI. Evaporation from reservoirs, VII. Influence of vegetation on evaporation, VIII. Recommendations for calculation of evaporation by the suggested method, and IX. Examples of computations. Extensive computation tables are included in appendix. *Subject Headings:* **1. Evaporation from reservoirs 2. Evaporation estimation 3. U.S.S.R.**—*M. R. and N. A. Zikeev.*

7.3–16 551.582.2(87)

*Gonzalez, P., Epifania (*Dir. Met. Serv., Venezuela*), **Datos detallados de climatología de Venezuela.** [Detailed data on climatology of Venezuela.] *Venezuela. Dirección de Salubridad Pública. División de Malariologia, Publicaciones*, No. 8, Dec. **1948.** 639 p. almost entirely tables. graphs. **DLC**—The present volume contains data from numerous stations which did not exist in 1941 when the author's **Climatología de Venezuela** was published. For Caracas data since 1935 on prevailing winds, average speed of wind, hours of sunshine (1936–1946), evaporation (1937–1946), rainfall and days with rain (1891–1946), maximum rain in 24 hours (1935–1946), relative humidity (1937–1946), maximum mean and minimum temperature, pressure (maximum mean and minimum); and for other stations rainfall and number of rainy days, and where available temperature, wind and pressure data for each month of record are presented in neat well annotated tables. *Subject Headings:* **1. Climatic data 2. Climate of Venezuela 3. Venezuela.**—*M.R.*

7.3–17 551.58(02) 551.582(497.1)

Milosavljevic, Marko, **Klimatologija.** [Climatology.] Belgrade, Izdav. Pref. Narodne Repub. SRBIJE, **1951.** 203 p. 28 figs. (some fold. at end), 58 tables. **DLC**—A small but

condensed and technical climatology text, evidently intended for agricultural climatologists or students of agriculture and related sciences. It opens with a discussion of the general concepts of climate and climatology. The individual factors such as temperature, humidity, evaporation, cloudiness, precipitation, rainy and dry periods, snow cover wind; solar and physical climatology; climatic zones; mountain climates; microclimate, vertical distribution of elements in ground layer; agricultural climatology and, finally, the climate of Yugoslavia are reviewed. Examples throughout the book in text, tables and figures are from Belgrade or other Yugoslav stations. Theory is presented where necessary. *Subject Headings:* **1. Climatology textbooks 2. Microclimate 3. Agricultural climatology 4. Climate of Yugoslavia 5. Yugoslavia.**—*M.R.*

7.3–18 523.5(02)

†*Lovell, A. C. Bernard, **Meteor astronomy.** Oxford, Clarendon Press, **1954.** 463 p. 186 figs., 175 tables, numerous foot-refs., numerous eqs. *International Series of Monographs on Physics*, ed. by N. F. Mott and E. C. Bullard. **DLC**—This book deals mainly with the astronomical aspects of meteors as distinguished from meteorites, or micro-meteorites. Meteors and the zodiacal light, Doppler methods (fast and slow Doppler) of observation by radio, effect on E region, electron density in E region; evaporation, speed, direction, height, drift, etc. are treated among other subjects. The physics of meteors is not considered. *Subject Headings:* **1. Meteor astronomy 2. Textbooks.**—*M.R.*

## GENERAL GEOPHYSICS AND METEOROLOGY

### EXPEDITIONS (ARCTIC, ANTARCTIC)

*See also:* **Project Mint Julep** (U. S. Arctic, Desert & Tropic Information Center), 7.3–1; **Arctic research,** 7.3–36.

7.3–19 550.389(987)

Penton, E. M., **Compass observations on a cruise through the Northwest Passage.** *Institute of Navigation, London, Journal,* 8(1):60–66, Jan. **1955.** 3 figs. **DWB**—Observations on the Ice-breaker "Labrador" in the Canadian Arctic are described and a map of lines of equal horizontal intensity given for 1955. The magnetic pole probably oscillates in an ellipse inside the line of 1000 gamma. *Subject Headings:* **1. Magnetic charts 2. Canadian Arctic.**—*C.E.P.B.*

7.3–20 551.506.5(261)

Evans, Frank, **The *Petula* Transatlantic expedition 1953–54.** *Institute of Navigation, London, Journal,* 8(3):205–210, July **1955.** fig., 2 photos. **DWB**—"Petula" is a 50-ft yawl and towed a small raft astern. A voyage under a minimum of sail was made from Dakar, Nov. 27, 1953, to near Barbados, Dec. 2, 1954. Biological and hydrographical work was done and a meteorological record (including Aitken nuclei counts) was kept, but apart from the fact that the weather was worse than expected no details are given. *Subject Headings:* **1. Expeditions 2. "Petula" Transatlantic Expedition, 1953–54 3. North Atlantic.**—*C.E.P.B.*

7.3–21 551.5:91.04(987) 551.506.5(71:98)

**Arctic patrols of the Royal Canadian Mounted Police, 1949–51.** *Polar Record,* 7(50):405–413, May **1955.** 3 figs. Also: **Arctic patrols of the Royal Canadian Mounted Police, 1952–54.** *Ibid.,* 7(51):499–506, Sept. **1955. DLC**—1) A number of patrols in the Canadian Arctic archipelago are described, with some weather observations and temperatures. 2) Summary of reports by the Commissioner. Accounts are given of a number of journeys by sled or boat, with much incidental information about the weather and ice conditions in the Canadian Arctic. *Subject Headings:* **1. Arctic expeditions 2. Canadian Mounted Police 3. Canadian Arctic.**—*C.E.P.B.*

7.3–22 551.506.5(98)

Shcherbakov, D. I., **In the heart of the Arctic.** Translation from his original Russian in *Priroda*, 43(11):73–84, Nov. **1954,** by E. R. Hope. *Canada. Defence Research Board, T* 171 R, Feb. **1955.** 12 p. photos. **DWB**—An interesting account of the author's 16,000 km trip by air to the various Arctic geophysical stations established by the High Latitude Expedition of 1954. The author was a representative of the Division of Geographic Science of the Akademiia Nauk, U.S.S.R. He left on April 27, 1954 in a L 1–2 aircraft, transferred at the edge of the Arctic Ocean to an I L-12 used for ice surveys, then to Novaya Zemlya, and Stations North Pole III ($\frac{3}{4}$ distance from Wrangel Island to Pole) and North Pole IV ($\frac{1}{4}$ distance from Wrangel Island to Pole), Franz Josef Archipelago, the Pole, Wrangel Island, Chuckchi Peninsula, etc. Ice reconnaissance, meteorological and magnetic surveys, oceanographic work and other features of this, the largest coordinated Arctic expedition, are described and illustrated. *Subject Headings:* **1. Arctic geophysical research 2. Arctic expeditions 3. High Latitude Expedition (U.S.S.R.), 1954 4. Polar stations 5. U.S.S.R. 6. Translations. I. Hope, E. R.** (*Trans.*).—*M.R.*

7.3–23 551.5(99) 551.465(99)

Simpson, Frank A. (*ed.*), **The Antarctic today: a mid-century survey by the New Zealand Antarctic Society.** Wellington, A. H. and A. W. Reed in conjunction with the New Zealand Antarctic Society, **1952.** 389 p. figs., 45 plates. **DWB**—A well-illustrated book covering Antarctic geography, biology, oceanography, meteorology, research, exploration, etc., with special emphasis on New Zealand's contributions in these fields. The chapter on Glaciers and Glaciology by N. E. Odell, and that on Oceans by Charles A. Fleming are of great interest, but have not been abstracted separately. On p. 106 there is an excellent map showing names of basins and seas in Antarctic. Ch. 11 (Meteorology, by Martin), Ch. 12 (Aurora Australis by I. L. Thomsen) and Ch. 13 (Ionospheric research by Beagleﬁ) are abstracted separately. *Subject Headings:* **1. Antarctic research 2. Antarctic ocean currents 3. Antarctic Seas 4. New Zealand.**—*M.R.*

7.3–24 91.04(99)

†Kearns, William H., Jr. and Britton, Beverley, **The silent continent.** N. Y., Harper, **1955.** 237 p. photos, ports., bibliog. at end of each chapter. Appendix: Chronology of exploration in the Antarctic, p. 223–237. **DWB**—Chapters discuss the search, discovery, beliefs, sponsors of exploration, U. S., Norwegian, British and other major expeditions and, finally, aerial exploration, and recent claims. The tone of the book is entirely narrative, but it contains a lot of information about weather, climate, ice, geology, weather observations, aviation conditions, the Byrd Expedition, and U. S. Navy Operation Highjump. *Subject Headings:* **1. Antarctic exploration 2. Operation Highjump 3. Antarctic chronology 4. Antarctica.**—*M.R.*

7.3–25 551.509.1(99)

**South Pole Seabee operators.** *International Engineer*, Wash., D. C., 98(8):5, Aug. **1955.** photo. **DLC**—Tractors, especially made for the Antarctic where temperatures of −65°F are prevalent, are to be used by the U. S. Navy Task Force 43 in Operation Deepfreeze which will set up 3 bases for the International Geophysical Year, 1957–58 operations by the U. S. The 24 track-type tractors and 16 electric tractors are manufactured by the Caterpillar Tractor Co., Peoria, Ill. The base station will be set up at Little America, from which parties will move by tractor train in Oct. 1956 to set up 2nd station in Marie Byrd Land. The third station will be set up by air-lift at or near the South Pole. Two of the tractors will be used at the South Pole weather station. *Subject Headings:* **1. International Geophysical Year Antarctic stations 2. Tractors 3. Antarctic weather stations 4. Operation Deepfreeze.** —*M.R.*

## INTERNATIONAL GEOGRAPHICAL YEAR

7.3–26 55:06 551.5:06

International Geophysical Year, 1957/1958. Comité Spécial, **Meeting of the Special Committee of the International Geophysical Year, Rome, Sept. 30–Oct. 4, 1954.** 12 sections,

each separately paged. Mimeog. **DLC**—Includes reports of the following groups: 1. World days. 2. Meteorology. 3. Geomagnetism. 4. Airglow and aurora. 5. Ionosphere. 6. Solar activity. 7. Cosmic rays. 8. Latitudes and longitudes. 9. Glaciology. 10. Oceanography. 11. Rockets. A complete list of attendants, transactions of the assembly of CSAGI at Rome from Sept. 30–Oct. 4, 1954, including resolutions and recommendations, lists of stations, program of work, etc. for each of the 11 sub-committees named above plus work of the 12th and 13th sub-committees (Geophysical distribution and Publications and publicity) and names of chairman and members of the 13 committees, the activities of the President (S. Chapman), Vice President (L. V. Berkner), and Secretary General (M. Nicolet) in 1953 and 1954 are reported. See p. 24–26 of Section 2 for notes on publications by M. Rigby. *Subject Headings:* **1. CSAGI meeting, Rome, Oct. 1954 2. International Geophysical Year, 1957–58 3. International Geophysical Year publications. I. Rigby, M.**—*M.R.*

7.3–27 55:06 551.5:06

*International Geophysical Year, 1957/1958. Comité Spécial (CSAGI), **Second Meeting, Rome, Sept. 30–Oct. 4, 1954** [**Proceedings, continued**]. Its *Bulletin d'Information*, No. 5, **1955.** 79 p. tables. **DWB.** Preprint from *International Union of Geodesy and Geophysics, IUGG Bulletin d'Information, News Letter*, No. 11, **1955.**—This report lists stations in all parts of the globe, with geographical and magnetic coordinates, proposed for IGY, 1957/58, under headings of Meteorology (including ozone, radiation and spherics stations), Geomagnetism, Aurora and airglow, Ionosphere, Solar activity, Cosmic ray, Latitude and longitude, Glaciology, Oceanography, Rockets and according to Arctic, Antarctic, Equational, 80°–70°W, 10°E and 140°E longitude lines. In all, several thousand stations are listed. *Subject Headings:* **1. International Geophysical Year networks 2. Station location indexes.**—*M.R.*

7.3–28 551.5:06 55:06

**Third International Geophysical Year 1957–58.** *Journal of Scientific and Industrial Research, New Delhi, Sec. A*, 14(4):162–163, April **1955. DWB**—Brief information on the enterprise is followed by an outline of the co-ordinated work program set up by the National Committee of India. The names and addresses of the members are listed. The national program is explained briefly under the following subject headings: (1) World days, 2) (Meteorology, (3) Geomagnetism, (4) Airglow and aurora, (5) Ionosphere, (6) Solar activity, (7) Cosmic rays, (8) Latitudes and longitudes, (9) Glaciology and (10) Oceanography. *Subject Headings:* **1. International Geophysical Year, 1957–58 2. International Geophysical Year program 3. India.**—*W.N.*

## SERVICES

7.3–29 551.5:06

**British Caribbean Meteorological Service.** *World Meteorological Organization, WMO Bulletin*, 3(1):28–30, Jan. **1954.** 2 figs. **DWB**—A newly established service with headquarters in Port of Spain, Trinidad and main meteorological offices, providing also a 24-hour service for aviation in Trinidad, Jamaica and the Bahamas. Other territories included are: British Guiana, Barbados, and British Honduras. *Subject Headings:* **1. Meteorological services 2. Caribbean Area. I. British Caribbean Meteorological Service.**—*A.A.*

7.3–30 551.5:061.1(7)

[Galloway, J. L.], **Meteorology in South America: first session of Regional Association III.** *World Meteorological Organization, WMO Bulletin*, 3(1):6–9, Jan. **1954.** photo. **DWB**—The association prepared a list of 477 surface synoptic reporting and 19 upper air stations as a minimum for South America. Brazil intends to operate 1–2 stationary weather ships in the South Atlantic. Agricultural aspects and the artificial production of rainfall were discussed at this first session. *Subject Headings:* **1. Meteorological coordination 2. Weather ships 3. WMO. Regional Association III 4. South America.**—*A.A.*

7.3–31 551.5:061

Faust, Heinrich, **Organisation und Arbeitsweise des Wetterdienstes.** [Organization and operation of the weather service.] *Naturwissenschaftliche Rundschau*, Stuttgart, 8(11):427–

430, Nov. **1955. DWB**—An account of the common basis of weather services in all parts of the world, exemplified by Germany. The article describes the standard observations, coding, transmission and plotting, drawing of sea level and upper isobars, upper air observations, etc. and preparation of short-range and extended forecasts. The author then turns to various climatological activities and their economic uses. Very general. *Subject Heading:* **1. Meteorological services.**—*C.E.P.B.*

7.3–32 551.5:06(73)

Reichelderfer, F. W. (*U. S. W. B., Wash., D. C.*), **The United States Weather Bureau.** *Science*, 120(3124):7A, Nov. 12, **1954. DWB**—A brief concise account of the service performed by the U. S. Weather Bureau, beginning with its organization 85 years ago as a service for shipping, and concluding with the enumeration of several specialized services performed for aviation, forestry, and horticulture and flood, hurricane, climatological and research activities looking toward a new era of increased mechanization. *Subject Headings:* **1. Meteorological services 2. U. S. Weather Bureau.**—*M.R.*

## OBSERVATORIES

7.3–33 550.385(431) 550:384

Fanselau, G., **Vorläufiger Bericht über die Beobachtungen am Adolf-Schmidt-Observatorium für Erdmagnetismus in Niemegk in der Zeit vom 1. Januar bis 30. April 1952.** *Also:* **. . . vom 1. Mai bis 31. August 1952** and **. . . vom 1. September 1952 bis 31. August 1953.** [Preliminary report on observations at the Adolf Schmidt Geomagnetic Observatory in Niemegk Jan. 1–April 30, 1952. Also: . . . May 1–Aug. 31, 1952 and . . . Sept. 1, 1952–Aug. 31, 1953.] *Beiträge zur Geophysik*, 63(1, 3):71–78, 234–240, **1953;** 64(2):95–107, **1954.** 8 figs., 16 tables. **DWB**—The first report of the Potsdam Observatory includes daily magnetic character and code figures, curves of components and of "bay" disturbance of Jan. 5–12, 1952. Report 2 gives for each month tables of general geomagnetic character and the character figures $K_1$ and $K_2$. Diagrams show the day to day variations of the 3 components, a typical double bay disturbance on May 7 and a large pulsation on July 31. Report 3 gives magnetic character figures for 1952–53 and code figures $K_1$ and $K_2$. The variations of N, E and V components are shown graphically. *Subject Headings:* **1. Magnetic disturbances 2. Niemegk, Germany.**—*C.E.P.B.*

7.3–34 551.501.9:551.594.7(425)

Smith-Rose, R. L., **Radio research station, Ditton Park, Bucks.** *Nature*, London, 175(4465):921–923, May 28, **1955.** 2 figs. **DWB**—An account of the research program of the Station and its associated observatories (2 in British Isles, 5 overseas). This includes influence of meteorological conditions on transmission of very short waves, continuous study of the ionosphere by vertical sounding, reflection and scattering, and noise background including sferics. The plan is shown of a special building in course of erection to replace temporary huts. *Subject Headings:* **1. Radio observatories 2. Ditton Park, England.**—*C.E.P.B.*

7.3–35 550.3

Pakistan. Ministry of Education, **Geophysical Observatory Quetta: a study in technical assistance.** Karachi, Pub. by the Govt., [1954?] 35 p. 4 photos. **DWB**—A neat, illustrated pamphlet describing the new geophysical observatory 6 mi west of Quetta (elevation 1750 m) on the N.W. frontier of West Pakistan in what used to be Baluchistan. The observatory, comprising 6 main buildings, is fitted with modern equipment and staffed with native and exchange personnel for doing seismological, geomagnetic, atmospheric physics and other types of geodetic or geophysical research. The cloud physics and ozone work has been carried on by E. M. Fournier d'Albe since 1952. A good library, separately housed, is being built up for geophysical research workers. G. Norgaard of UNESCO was in charge of the scientific organization of the program and the observatory from 1951 to 1953. WMO technical assistance was effective after 1953. *Subject Headings:* **1. Geophysical observatories 2. Quetta Geophysical Observatory 3. WMO. Technical Assistance Programme 4. Quetta, Pakistan.**—*M.R.*

## SOCIETIES—CONFERENCES

*See also:* **IGY, 1957/58,** 7.3–26; **IGY, 1957/58,** 7.3–27; **3rd IGY, 1957/58,** 7.3–28.

7.3–36 551.5(98) 550.3(98)

**(Twenty-two field research projects scheduled by the Arctic Institute of North America.)** *Science*, Wash., D. C., 122(3162):235, Aug. 5, **1955. DLC, DWB**—Projects centered at Point Barrow, Alaska, and scattered through Alaska and North Canada, in geophysics, radio propagation, auroras, geomagnetism and glaciology, among others, are mentioned and names of principal investigators and institutions with which they are affiliated are given. *Subject Headings:* **1. Arctic geophysicals research 2. Arctic.**—*M.R.*

7.3–37 061.2:527

Sadler, D. H., **Presidential address. The role of the Institute.** *Institute of Navigation, London, Journal*, 8(1):1–11, Jan. **1955.** photo, fig., table. **DWB**—An account of the aims of the Institute, i.e., to advance the science and practice of navigation by sea and air. Of 270 papers published, 18 dealt with oceanography and hydrography and 17 with meteorology. *Subject Heading:* **1. Institute of Navigation, London.**—*C.E.P.B.*

7.3–38 551.5:061.2(411)

†Wedderburn, Sir Ernest, **The Scottish Meteorological Society.** *Weather*, 10(11):363–367, Nov. **1955.** Also: McIntosh, D. H., **Scottish Meteorological Society centenary exhibition, 1955.** *Ibid.*, 372–374. photo. **DWB**—The Scottish Meteorological Society was founded in 1855, mainly to collect observations. A. Buchan became Secretary in 1860. The **Scottish Meteorological Journal** was founded in 1864. Ben Nevis Observatory was operated 1883–1904, and other activities were in progress in 1880–1900. Buchan died in 1907. In 1920 the Meteorological Office took over the Edinburgh office of the Society and in 1921 the Society merged with the Royal Meteorological Society. McIntosh describes an exhibition "Scotland's Weather 1855–1955" at the Royal Scottish Museum, Edinburgh, which also illustrated the work of many Scottish meteorologists. *Subject Heading:* **1. Scottish Meteorological Society.**—*C.E.P.B.*

7.3–39 551.5:06

Makjanić, Berislav, **I. Sastanak meteorologa-klimatologa Hidrometeorološke Službe FNRJ.** [First meeting of meteorologists and climatologists of the Yugoslav Hydrometeorological Service.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 3(3/4):85–88, July/Dec. **1954.** Also: **Sastanak klimatologa Hidrometeorološke Službe FNRJ.** [Meeting of climatologists of the Yugoslav Hydrometeorological Service.] *Ibid.*, p. 123–127. **DWB**—Resolutions adopted and recommendations made by the national climatological meeting in Zagreb in Sept. 1954 are given in these reports. The agenda comprised: 1) Time of daily observations; 2) Climatological data analysis; 3) Analysis of long series; 4) Climatological studies for the needs of hydrology, aviation, navigation and others; 5) Field practices; 6) Weather analysis for Yugoslavia; 7) Microclimatological research; 8) Climatological studies; 9) Publishing and translating work; 10) Issuing of monthly bulletin and 11) Miscellaneous matters. *Subject Headings:* **1. Yugoslav Hydrometeorological Service 2. Meteorological Conferences 3. Climatology.**—*G.T.*

7.3–40 551.5:06(08)

**Report on the Meteorological Conference in Helsinki, May 1953.** *Geophysica*, Helsinki, 4(3):135–152, **1953.** Contents: Program. Abstracts of papers. **DWB**—The Geophysical Society of Finland and the Institute of Meteorology, Univ. of Helsinki arranged a symposium on May 19–22, 1953 at the Institute of Physics, Helsinki. Papers concerned practical and theoretical aerology and numerical forecasting and micrometeorology. E. Palmén was chairman. Twenty delegates from 7 foreign countries attended. Twenty-two papers were read at 6 sessions, a banquet was held at the Country Club and an excursion arranged to the experimental station of the Helsinki Univ. Institute of Meteorology. Abstracts are given

for a number of papers read. *Subject Headings:* **1. Meteorological symposia 2. Helsinki University. I. Geofysiikan Seura, Helsinki II. Helsinki. Universitet. Meteorologian Laitos.**—*M.R.*

# EDUCATION, HISTORY AND BIOGRAPHY

## EDUCATION

7.3–41 551.5:37

**Graduate study in meteorology at University of California, Los Angeles.** *American Meteorological Society, Bulletin*, 36(6):294–295, June **1955.** fig. **DLC, DWB**—Facilities for graduate instruction and for research and fellowships and scholarships available are discussed. A photograph of the building housing the Department of Meteorology is reproduced. *Subject Headings:* **1. Meteorological education 2. Doctorate in meteorology 3. California. Univ. at Los Angeles. Dept. of Meteorology.**—*I.L.D.*

7.3–42 551.5:37

Boatman, Loren F.; Root, Oscar M.; Allan, Charles R. et al., **Weather activity in the nations schools.** *Weatherwise*, Boston, 7(5):125–127, 136, Oct. **1954. MH-BH**—A collection of short articles dealing with meteorological education at Decatur, Ill., North Andover, Springfield, Hawthorne (all Mass.); Flagler, Calif.; Auburn, Wash.; Fort Wayne, Ind. and Philadelphia, Pa. Students usually make local weather observations, study weather maps and, in some cases, make trial forecasts or serve even the local region with weather advice. *Subject Headings:* **1. Meteorological education 2. United States. I. Michelson, Louis F. II. Knight, Eugene T. III. King, A. J. IV. Miriam Joseph, Sister V. Lampe, Chester E.**—*A.A.*

## HISTORY

*See also:* **Prof. Abbe . . . America's first weatherman** (Abbe), 7.3–5; **Met. data pub. in Japan** (Arakawa et al.), 7.3–13; **Scottish Met. Soc.** (Wedderburn), 7.3–38.

7.3–43 551.58(09)

†Leighly, John, **Climatology.** (In: James, P. E. and Jones, C. F. (*eds.*), **American geography.** Syracuse Univ. Press, **1954.** p. 334–361. 82 refs.) **DWB**—This paper comprises an excellent review of the history and development of climatology in America, and a critical source of reference material on all aspects of climatology. The author does not limit himself to the point of view of the geographer but considers climatology as an almost independent discipline. The sources of data from the earliest years of the U. S. Army Medical Dept. and the Smithsonian Institution, BLODGET's pioneer work under the bludgeon of JOSEPH HENRY, the work of the Signal Service and later the U. S. W. B., academic work of R. DE C. WARD and the influence of HANN and W. M. DAVIS; later contributions of C. F. BROOKS, H. E. LANDSBERG and V. CONRAD and last, but not least, the modern trend toward dynamic, synoptic and applied climatology of HAURWITZ, LANDSBERG, W. C. JACOBS and in agricultural climatology by CLEVELAND ABBE, J. W. SMITH, KINCER and others. *Subject Heading:* **1. History of climatology.**—*M.R.*

7.3–44 551.501.9:378.4(411)

Geddes, A. E. M., **The development of the study and practice of meteorology at Aberdeen.** *Weather*, 10(11):385–389, Nov. **1955.** fig. **DWB**—An astronomical and meteorological observatory was instituted at Marischal College in 1780; records for 1825–36 exist. Teaching of meteorology began in 18th century. Other stations in Aberdeen ran from 1858–77 and 1857–80. The Meteorological Committee observatory was established in 1868 and closed in 1887. *Subject Headings:* **1. Teaching of meteorology 2. Meteorological observatories 3. Aberdeen, Scotland.**—*C.E.P.B.*

7.3–45 551.507.3(09)

†Keil, Karl, **Beiträge zur Geschichte der Aerologie.** [Contributions to the history of aerology.] *Meteorologische Rundschau*, Berlin, 8(7/8):134–135, July/Aug. **1955.** 34 refs.

Also: . . . **Pt. 2.** *Ibid.*, 8(11/12):201-203, Nov./Dec. **1955. DLC**—Gives a brief history of methods of upper air investigation from 1647 (PERIER's ascent of Puy de Dome with a barometer). Other significant dates are: first manned balloon (1783), registering balloon (1892), kites carrying thermometers (1748), fixed balloon (1887), kite-balloon (1897), pilot balloon (1809), airplane (1912) and radiosonde (1927). Pt. 2 deals with aerological work in Germany, 1899–1914. *Subject Heading:* **1. History of aerology.**—*C.E.P.B.*

7.3–46 551.5(05)(09)

Keil, Karl, **Meteorologische Literatur.** [Meteorological literature.] *Meteorologische Rundschau*, Berlin, 8(7/8):115-116, July/Aug. **1955. DLC**—Meteorological papers, rare before 1850, increased rapidly after 1872, especially publications of data. The recent history and the purpose of German yearbooks and monthlies is summarized. There are now in the world about 200 monthlies, 150 yearbooks, 150 purely meteorological and 550 partly meteorological journals. To follow all these would take much time, hence the need for bibliographies. *Subject Headings:* **1. History of meteorology 2. Meteorological periodicals.**—*C.E.P.B.*

## BIOGRAPHY

*See also:* **Prof. Abbe . . . America's first weatherman** (Abbe), 7.3–5.

7.3–47 551.5:92

Sverdrup, H. U. (*Oslo Univ.*), **A la mémoire de Vilhelm Bjerknes (1862–1951).** [In memory of Vilhelm Bjerknes, 1862–1951.] *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Mémoires et discussion* p. 1–8. pub. 1953. **DWB**—The personality of VILHELM BJERKNES is outlined with emphasis on his influence on the development of theoretical meteorology and oceanography, starting with the introduction of the circulation theorem and up to the publication of the monumental **Physikalische Hydrodynamik.** (For 4 other obituaries of V. Bjerknes, *see* 5.9–27, Sept. 1954, *MAB.*) *Subject Headings:* **1. Biography 2. Hydrodynamics. I. Bjerknes, Vilhelm.**—*A.A.*

7.3–48 551.5:92

Thomson, Andrew, **Obituary notice [of] Mr. A. J. Connor, M.A.** *Royal Meteorological Society, Quarterly Journal*, 81(350):651-652, Oct. 1955. **DWB**—ABRAHAM JAMES CONNOP was born on Oct. 20, 1884 in Northern Ireland, and emigrated to Canada in 1888. Entered Meteorological Service of Canada 1907, and took charge of the Climatological Section, retiring in 1950. Author of many works on climate of Canada. *Subject Headings:* **1. Obituaries 2. Connor, A. J.**—*C.E.P.B.*

7.3–49 551.5:92

Jones, T. W. V., **Obituary [of] Frank M. Dean, M.B.E.** *Meteorological Magazine*, London, 84(1001):357–358, Nov. **1955. DWB**—Born March 31, 1894, died Sept. 15, 1955. Entered British Meteorological Office 1920, dealing mainly with aviation meteorological services. His main activities however were as Chairman of the Meteorological Office Branch of the Institution of Professional Civil Servants and of the Air Ministry Departmental Whitley Council. *Subject Headings:* **1. Obituaries 2. Dean, F. M.**—*C.E.P.B.*

7.3–50 551.5:92

Bleeker, W., **Obituary notice [of] Prof. E. van Everdingen.** *Royal Meteorological Society, Quarterly Journal*, 81(350):651, Oct. **1955. DWB**—EWOUD VAN EVERDINGEN was born in 1873 at Delft, died July 17, 1955. Studied physics at Leiden, joined R. Netherlands Meteorological Institute 1903, director 1905, Professor at Utrecht 1910. Secretary and later President of International Meteorological Organization. *Subject Headings:* **1. Obituaries 2. van Everdingen, Ewoud.**—*C.E.P.B.*

7.3–51 551.5:92

Franssila, Matti and Sucksdorff, E., **J. Keränen—70th anniversary.** *Geophysica*, Helsinki, 4(3):83-86, **1953.** port. **DWB**—Born June 1, 1883 at Patalmo, Finland. He was Chief of Geophysics Observatory at Sodankylä 1913–1917, Chief of Finnish Meteorological

Office 1921–1933 and director until retirement in 1953. His chief contributions in the fields of geomagnetic surveys, geomagnetism, soil temperature, climatology, agricultural climatology, forest meteorology, and radiation are reviewed and a few citations given. *Subject Headings:* **1. Keränen, Jaakko 2. Biography.**—*M.R.*

## BIBLIOGRAPHY

*See also:* **Met. data publ. in Japan** (Arakawa et al.), 7.3–13.

7.3–52 581.05:016(965) 551.582:016(965)

†Sachet, Marie Hélène and Fosberg, F. Raymond, **Island bibliographies. Micronesian botany. Land environment and ecology of coral atolls. Vegetation of tropical Pacific Islands.** Comp. under the auspices of the Pacific Science Board. Wash., D. C., National Academy of Sciences—National Research Council, **1955.** 577 p. p. 495–531: **List of Serial abbreviations** (with full title of serial, libraries which have holdings, even Library of Congress call numbers in many instances). p. 533–577, **Addenda** (to 3 sections of the bibliography and to list of serials). **DGS**—This mammoth bibliography contains several hundred fully annotated references to literature (up to 1954) on climate, meteorology and typhoons in the Pacific Islands, with an author index to this material on p. 327–8. (*See also* 4I–269, and 6A–115, Sept. 1953 and Jan. 1955, *MAB.*) *Subject Headings:* **1. Ecology bibliographies 2. Climatology bibliographies 3. Bibliographies on climatology 4. Coral atolls 5. Annotated bibliographies 6. Pacific Islands. I. Pacific Science Board II. National Research Council, Wash., D. C. III. National Academy of Sciences, Wash., D. C.**—*M.R.*

7.3–53 550.38:025.45

**Dezimalklassifikation des Schrifttums erdmagnetischen Inhalts.** [Decimal classification of literature containing geomagnetism.] *Deutsche Hydrographische Zeitschrift*, Hamburg, 8(1):31–38, **1955. DWB**—German translation of International Federation for Documentation's "Extensions and Corrections to the U.D.C." 2(2), 1954. The main subdivisions are:

550.380 Geomagnetic technique, Observations and methods of measurement, Equipment
550.382 Surface features of the (steady) field
550.383 Underlying plan. Organic conceptions
550.384 Origin and secular change of the field
550.385 Transient magnetic effects: variations, fluctuations and storms
550.386 Magnetic activity. Fluctuations, quasipersistence etc.: statistical and collateral aspects (for use with:)
550.387 Telluric electricity. Earth currents
550.388 Overhead activation phenomena of ionosphere, luminous manifestations etc.
550.389 Magnetic surveys, charts, observatory results.

These numbers are subdivided in great detail. *Subject Headings:* **1. Geomagnetic classification 2. Universal Decimal Classification.**—*C.E.P.B.*

7.3–54 019.941.5:48

Panov, D., [**Scientific abstracting in the U.S.S.R.**]. *Science*, Wash., D. C., 121(3148) 627–628, April 29, **1955. DWB**—Quotation (translation) from **Pravda** telling of wholesale scientific abstracting project in U.S.S.R. 6892 foreign and 998 Soviet periodicals are analyzed regularly. Sections on Mathematics, Physics, Chemistry, Biology and Mechanics are mentioned [these are sections of **Referativnyĭ Zhurnal** (ed.)]. These abstracting journals have been issued for about 2 years, and are expected to be used in all libraries and laboratories of scientific institutions. (*See* 6A–31, Jan. 1955, *MAB.*) *Subject Headings:* **1. Soviet scientific abstracts 2. Scientific abstracting.**—*M.R.*

7.3–55 551.5:63:01

†U. S. Weather Bureau, [**Bibliographies and experiment station projects dealing with weather in twelve North-Central Region states**]. Letter of transmittal, April 28, **1953.**

each section repaged (some sections unpaged). Mimeo. **DWB**—This bibliography consists of classified lists of projects dealing with relations of climate, weather and weather factors to animal and plant production, with references cited in publications which emanated from the projects for eight of the states. Entries in each section under each state are arranged chronologically from as early as 1896 to 1954. The states represented are North and South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri, Wisconsin, Illinois, Indiana, Michigan and Ohio. *Subject Headings:* **1. Agricultural meteorology bibliographies 2. Experiment station projects 3. Midwest United States.**—*M.R.*

# PRACTICAL AND APPLIED METEOROLOGY

## MARINE METEOROLOGY AND OCEANOGRAPHY

*See also:* **Oceanog. data analysis** (Le Floch) 7.3–14; **Transatlantic expedition** (Evans) 7.3–20; **Marine Met. Yearbook** (Denmark. Met. Inst.), 7.3–94, 7.3–95.

7.3–56 551.46.018

*Cox, Charles and Munk, Walter (*Scripps Inst. of Oceanog.*), **Statistics of the sea surface derived from sun glitter.** *Journal of Marine Research*, New Haven, Conn., 13(2):198-227, **1954.** 7 figs., table, 17 refs., 43 eqs. **DLC.** Also issued as *California. Univ. Scripps Institution of Oceanography, Contributions, New Series*, No. 731. **MH-BH**—Aerial photographs of the sun's glitter on the sea surface, taken under carefully chosen conditions in the Hawaiian area, were coordinated with measurements of wind (1–27 kn) from a vessel. Statistics of the glitter, interpreted in terms of the statistics of the slope distribution of the sea surface, gave the following results: (1) As a first approximation the slope distribution is found to be Gaussian; this can be accounted for by an arbitrarily wide *continuous* spectrum of ocean waves, but not by a spectrum consisting of a few discrete frequencies. (2) The ratio of the up/down-wind to crosswind components in mean square slopes is less than two; this indicates a directional "beam width" in excess of 130° for the relatively short waves that contribute to the slope spectrum. (3) The mean square slope, regardless of direction, increases linearly with wind speed and reaches a value of $(\tan 60°)^2$ for a wind speed of 14 m $sec^{-1}$; this empirical relation follows in form and to an order of magnitude from a spectrum proposed by NEUMANN on the basis of wave amplitude observations. A spectrum proposed by DARBYSHIRE cannot be reconciled without observations. Further results which have not been interpreted are: (4) An up- and down-wind skewness which increases with increasing wind speed is such as to make the most probable slope a few degrees rather than zero, with the azimuth of ascent pointing downwind. (5) A peakedness, which is barely above the limit of observational error, is such as to make the probability of very large and very small slopes greater than Gaussian. (6) Oil slicks laid by the vessel over an area of one quarter square mile reduce the mean square slope by a factor of two or three and eliminate skewness but leave peakedness unchanged. The distribution of particle acceleration is closely related to the distribution of slope. Accordingly, the total mean square acceleration increases linearly with wind speed and reaches a value (at the surface) of $(0.4\ g)^2$ at a wind speed of 14 m $sec^{-1}$. *Subject Headings:* **1. Ocean wave measurement 2. Aerial photography 3. Water surface slope.**—*Authors' abstract.*

7.3–57 535.33:551.463

*Atkins, W. R. and Poole, H. H., **Angular scattering of blue, green, and red light by sea water.** *Royal Dublin Society, Scientific Proceedings*, 26(18):313–323, July 26, **1954.** 2 tables, 4 figs., 4 refs. **DWB**—The procedure for measuring the scattering of blue, green and red light with the aid of an R.C.A. 1P22 photocell having a bismuth-cæsium surface is described. The optical system employed in this measurement is illustrated with a diagram. The results show that blue light is generally more scattered than either red or green. The differences become appreciable in sea water for angles near 90°. Little significant difference in scattering exists between green and red in any water tested. Zonal scattering is a minimum at 120° "but the reflection connection becomes so important that the reality of the rise observed for larger angles is somewhat doubtful." Successive filtering through collodion filtering of average

pore diameter 1.4$\mu$, 0.5$\mu$ and 0.1$\mu$ render sea water as limpid as the best doubly distilled water; this indicates that scattering by particles less than 0.1$\mu$ in diameter is insignificant in sea water. *Subject Heading:* **1. Scattering of light in water.**—*I.L.D.*

7.3–58 535.4:551.463

Kanwisher, John and Volkmann, Gordon, **A scattering layer observation.** *Science*, 121(3134):108–109, Jan. 21, **1955.** fig., 2 refs. **DLC**—In order to obtain better resolution in recording the deep-scattering layer which is generally believed to consist of marine organisms, a transducer was lowered to various depths. From the scattering record it is considered that the scattering is patchy as though caused by individuals and that the size of the "individuals" is small relative to 25 ft. The scatterers are rather affected by sound moving randomly. An average of one scatterer for every $3\times10^5$ ft$^3$ of sea occurs. The scattering layer in North Atlantic is best developed during the day at a depth of about 250 fathoms. *Subject Heading:* **1. Scattering of light in water.**—*I.L.D.*

7.3–59 551.46

**Oceanographic survey of the North Pacific Ocean.** *Science*, Wash., D. C., 121(3153):794, June 3, **1955. DWB**—Canada, Japan and the U. S. will undertake joint surveys of the N. Pacific from America to Japan and from the Tropic of Cancer to Bering Strait. Fisheries and physical, biological, chemical, meteorological and geological conditions will be investigated. Twenty fully equipped vessels will be engaged in survey of a 10 million sq mi area or 1/16 of the area of the globe. The time involved will be short enough to avoid seasonal changes in currents. Agencies cooperating are listed. *Subject Headings:* **1. Oceanographic surveys 2. North Pacific.**—*M.R.*

7.3–60 551.461.018

Tucker, M. J., **Sea-wave recording. A survey of the methods of wave measurement and recording used by the National Institute of Oceanography.** *Dock and Harbour Authority*, London, 34(397):207, Nov. **1953.** 11 p. 6 figs., 15 refs. **DH-NO**—Describes with diagrams: "Cambridge" pressure recorder, piezo-electric wave recorder and "hosepipe" wave and tide recorder, all for recording bottom pressure, inverted echo-sounder and capacitance-wire wave recorder for shore depth measurements, and several forms of deep-sea wave meters. A graphic recorder and photo-electric curve follower are also described. *Subject Heading:* **1. Wave meters.** —*C.E.P.B.*

7.3–61 532.593:551.465

Chien, Ning (*Univ. of Calif.*), **Ripple tank studies of wave refraction.** *American Geophysical Union, Transactions*, 35(6):897–904, Pt. 1, Dec. **1954.** 6 figs., table, 8 refs., 5 eqs. **MH-BH**—When the shore line and offshore contours are straight and parallel, wave refraction is governed by Snell's law, which states that the sine of the angle between the wave crest and the bottom contour is proportional to the velocity of wave propagation. Snell's law was verified in this study by analyzing the photographic records of wave refraction at a model beach with 1/40 slope and a straight shore line in a ripple tank. This study covers uniform waves with three different periods, non-uniform waves and three initial angles of wave approach. For the longest period waves, the experimental results seemed to give a refraction angle smaller than that indicated by Snell's law. *Subject Headings:* **1. Water wave refraction 2. Ripple tank studies.**—*Author's abstract.*

7.3–62 532.593:551.465

Shuleĭkin, V. V., **Razrushenie voln pod deĭstviem melkovod'ia.** [Wave destruction influence of shallow water.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizicheskaia*, No. 1–65–76, **1954.** 2 figs., table, 3 refs., 31 eqs. **DLC**—The distortion of the wave profile in shallow water is investigated. A hypothesis on the dependence of the phase velocity upon the phase of oscillation of the water level is developed from the equation of continuity involving the depth of the sea and the amplitude of the waves; it is suggested also by previous investigations dealing with the second overtone. There is established a natural regularity in the origin and development of overtones and their dependence upon energy from the fundamental

waves. Approximate formulas for constructing the profile of waves destroyed in shallow waters are developed. This relationship enables the determination of the time of passage of the waves over shallow water and the disruption of the wave profile in trochoidal waves of surges and in wind waves of distinct form. *Subject Headings:* **1. Wave decay 2. Shallow water effects.**—*Based on author's abstract.*

## AERONAUTICAL METEOROLOGY

*See also:* **Meteor astronomy** (Lovell), 7.3–18; **Visual range** (Garbell), 7.3–280.

7.3–63 551.5:629.13(237.1) 551.513.2:551.557

Gales, Donald M. (*Senior forecaster, TWA*), **Airways weather San Francisco-Cheyenne.** Trans World Airlines, Inc., Jan. 15, **1955.** 23 p. 7 figs., 2 tables, 5 refs. **DWB**—Report consists of description of terrain over route and on alternates to N. and S. of airways from San Francisco to Cheyenne, a discussion of air masses, fronts, cloud heights, seasonal changes in weather, frequency of hail, thunder, icing, turbulence, flight planning winds, the jet stream, the Sierra wave and associated high level turbulence, rotor clouds, etc., and finally, general rules for flying in the mountainous areas. A synoptic example and cross section for March 2, 1954 show typical conditions through a jet stream with abrupt increase in wind at 16,000 ft over Salt Lake Basin. *Subject Headings:* **1. Airways weather studies 2. Jet stream studies 3. San Francisco-Cheyenne air route.**—*M.R.*

7.3–64 551.55:629.13

Chadwick, R. H., **Operating and flight-planning techniques for the Viscount.** *Institute of Navigation, London, Journal,* 8(4):331–343, Oct. **1955.** 2 figs., 3 tables. **DWB**—For economic operation the fuel requirements of a flight must be nicely calculated. This is done for normal conditions, and graphs are given for altitude selection with strong headwinds and for time and operating costs with various wind conditions, to simplify planning. *Subject Heading:* **1. Flight plans.**—*C.E.P.B.*

7.3–65 551.551:629.13

**Plane's swirling trail lasts more than minute.** *Science News Letter,* Wash., D. C., 67(13): 200, March 26, **1955. DLC**—Experiments proved that the dangerous vortices of air formed behind a plane in flight are a function of the plane's wings. Instruments aboard a jet plane, flying at right angles into the turbulent trail, recorded deviation from the course. A jet pilot, following behind another jet plane, reported severe turbulence largely uncontrollable. A plane traveling .8 of the speed of sound leaves a one-minute active trail of turbulence extending 10.4 mi at 10,000 ft. *Subject Headings:* **1. Turbulence effects on airplanes 2. Jet aircraft 3. Turbulence behind jet aircraft.**—*W.N.*

7.3–66 551.553.6:656.71

Durst, C. S., **The effect of gusts on aircraft when landing.** *Institute of Navigation, London, Journal,* 8(4):354–357, Oct. **1955.** fig., table, 2 refs. **DWB**—From an analysis of M. A. Giblett, **Structure of wind over level country** (*see* 4B–71, Feb. 1953, *MAB.*), figures are given for maximum gust lasting 5–40 sec to be expected once an hour with mean speeds 10–30 kn. Some practical conclusions are drawn. *Subject Headings:* **1. Airport landing conditions 2. Gust frequencies.**—*C.E.P.B.*

7.3–67 551.553.6:656.71

Wadsworth, J., **The usability of airfields in gusty winds.** *Institute of Navigation, London, Journal,* 8(4):349–353, Oct. **1955.** 2 figs., table, 4 refs. **DWB**—The limiting cross-wind component in assessing the usability of an airfield is 13–20 kn, and gusts are usually assumed to be twice mean wind, which is too high a ratio. An alternative method of computing the critical cross-wind speed for gust ratios 1.4 to 1.6, and cross-wind components of 20–40 kn at any angle is set out in a table. Usability of London Airport is shown in a polar diagram. *Subject Headings:* **1. Airport landing conditions 2. Gust loads.**—*C.E.P.B.*

7.3–68 551.5:629.13(0

U. S. Civil Aeronautics Administration. **Realm of flight: presenting practical information about weather in relation to the piloting of private aircraft.** Rev. May 1954. Wash., D. C., U. S. Govt. Print. Off., **1954.** 41 p. 32 figs. (some col.). Price: **$.60. DLC**—A beautifully illustrated manual giving the highlights of meteorology which affect flying, with schemat paintings showing effects of pressure, density, wind, convection currents, land-sea breeze turbulence, clouds, mountain peaks, obstructions, clouds, fog, thunderstorms, air masses fronts, cyclones, etc. on flight, take-off or landing of aircraft. Weather maps and synoptic airways reports are treated briefly. *Subject Headings:* **1. Meteorology manuals for pilo 2. Aeronautical meteorology manuals.**—*M.R.*

7.3–69 551.5:629.13(0

Lee, Jean Theodore and Reber, Carl M., **Pilots' weather handbook.** *U. S. Civil Aeronautics Administration, Technical Manual,* No. 104, July **1954.** 143 p. 174 figs. inc photos). Meteorological glossary, p. 133–143. **DLC.** Revision of Haynes, Benarthur, C **Meteorology for pilots,** issued as its *Civil Aeronautics Bulletin,* No. 25, **1943. DLC**—Th book has been completely revised by members of the U.S.W.B. staff at Washington, D. C (CLEM, COLSON, CASKEY, CARLIN, KLINE, MOOK, THOMPSON, HAYNES, SIMPSON and others to include results of recent investigations of icing, turbulence, the jet stream, thunderstor structure, lee waves, radar storm or weather detection, rocket soundings, lightning, etc. addition to standard pilots textbook material. The glossary contains definition of >20 terms used in aviation meteorology. The last two chapters concern flying weather in th U. S. and sailplane weather. Most illustrations are schematic but a number of good climat maps of the U. S. are presented to show frequency of low ceiling, visibility, or thunderstorm at different seasons. *Subject Headings:* **1. Aeronautical meteorology textbooks 2. Aero nautical meteorology 3. Meteorology manuals for pilots 4. Manuals.**—*M.R.*

7.3–70 551.5:629.13(05) 551.508.8

U. S. Air Weather Service. **AWS Operations and Flying Safety Digest,** 4 o . June 195 Monthly. Sub-title: An official Air Weather Service Publication. continuously paged throug vol. tables. **DWB**—Each issue contains a score or more of items of varying length, consisti in news of Air Weather Service changes, innovations, etc. as well as instructions and articl on icing, accidents and weather, codes, stations, communications and other timely topic Beginning with Vol. 4, No. 6, June 1955, there will be a section on Radar Meteorology. T June issue contains 4 pages telling about increasing use of CPS-9 radar as new sets are install in various parts of the country, and the indications on the PPI or PHI scopes of wave formatio cyclogenesis, severe wind storms, hail, line squalls, etc. *Subject Headings:* **1. Aeronautic meteorology 2. Radar storm detection equipment.**—*M.R.*

7.3–71 523.4:629.19:(

Suez, Emilio, **La Sociedad Argentina Interplanetaria.** [Argentine Interplanetary Society *Aeronautica,* Buenos Aires, 15 157):40–41, April **1955.** photo. **DWB**—Background i formation regarding British Interplanetary Society and American Rocket Society, plus deta of organization and activities of the Argentine Interplanetary Society (SAI) founded in 195 Program for 1955 is outlined, and includes publication of an Information Bulletin, represent tion at VI International Conference on Astronautics, July 21–27, 1955 at Copenhagen, a organization of a course in astronautics. *Subject Headings:* **1. Astronautics 2. Argentin Interplanetary Society.**—*M.R.*

## ENGINEERING, INDUSTRIAL AND MEDICAL METEOROLOGY

*See also:* **Aerometric survey of Los Angeles Basin** (Renzetti), 7.3–3.

7.3–72 551.556:(

Heywood, G. S. P. (*Royal Observatory, Hong Kong*). **Pressure of typhoon winds on structures.** [In: UNESCO Symposium on Typhoons, Tokyo, Nov. 9–12, 1954. Proceeding pub. 1955. p. 11–15. 5 tables.] **DWB**—The effects of hurricane winds on buildings ar

other structures are not yet fully understood, and this paper gives a brief survey of the problems involved. Turbulence in high winds is first considered; gusts recur at irregular intervals of the order of 10 sec, and from this it is estimated that the lateral extent of the eddies causing these gusts is of the order of 1000 ft. A gust may therefore affect the whole face of a large building simultaneously. The presence of heavy rainfall increases the pressure exerted by the wind, but it is estimated that this increase amounts to only about 3% even in the heaviest downpours. An estimate is given of the pressure exerted on a plane surface by a gust of 130 kn, and some mention is made of the distribution of pressure and suction over different parts of a building. The effect of fluctuating forces on nonrigid structures is considered; there is a possibility that fatigue may occur after a long period in structures exposed to strong gusty winds, but owing to the irregularity of the gusts there does not seem to be any danger of resonant vibrations being set up. Knowledge of the structure of eddies in high winds could be obtained by means of an array of sensitive anemometers, and more accurate observations of the rate of rainfall in typhoons could be made by means of a rainfall intensity recorder installed with its rim flush with the ground. Wind tunnel experiments are needed to determine the effects of airstreams on models of different types of buildings. *Subject Headings:* **1. Typhoon pressure 2. Hurricane-force winds 3. Wind pressure on buildings.**—*Author's abstract.*

7.3–73 621.175:621.311.22 621.175:536.2

Kennedy, Geoffrey F. and Margen, P. H., **The economic selection of cooling towers for generating stations.** *Institution of Electrical Engineers, London, Proceedings*, Pt. A, 102(3): 279–289, June 1955. 12 figs., 9 tables, 5 refs., 12 eqs. Also: Margen, P. H., **The application of friction/heat-transfer correlations to cooling-tower design.** *Ibid.*, p. 290–300. 6 figs., 4 tables, 13 refs., 26 eqs. Discussion on both papers, p. 300–309. **DLC**—The first paper describes the construction of charts showing the economic duty conditions of natural- and mechanical-draught cooling towers for generating stations in the British climate. The charts are drawn in terms of two factors, namely (*a*) the annual station load-factor, and (*b*) the full-load turbine heat-rejection/sq ft of net exhaust area. Typical seasonal temperature and load cycles are assumed. The calculations indicate that past design practice often led to towers which were unduly large and water-temperature ranges which were unduly small. By correct design, net capitalized savings of the order of £200,000 per 240-MW station can be made in some instances. The advent of larger turbine units and the associated higher values of factor (*b*) will make higher water temperatures economical. With mechanical-draught towers, the water temperatures specified should generally be lower than with natural-draught units. A chart shows the effect of varying climatic conditions: higher air temperatures favor mechanical-draught. Circuits for combined river and cooling-tower schemes are examined. With these arrangements the cooling-towers generally operate mainly during the summer season, and consequently mechanical-draught towers are often economical. The thesis of the second paper is that friction and heat-transfer properties of cooling-tower packings are correlated, i.e., that an improvement in the heat-transfer properties can be obtained at the expense of an increase in friction. Methods of determining the economic fan power or chimney height are described and illustrated by worked examples. With the aid of the design chart, economic mechanical- and natural-draught tower designs can be prepared very quickly. *Subject Headings:* **1. Power stations 2. Cooling towers 3. Heat transfer.**—*From authors' abstract.*

7.3–74 621.311.21:06

Somov, N. V., **Vsesoiuznoe nauchno-tekhnicheskoe soveshchanie gidroenergetikov.** [All Union Scientific-technical Conference of Water Power Engineers.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:67, Jan./Feb. 1955. **DWB**—A note on the conference of Oct. 1954 containing brief statements on the more important discussions. These dealt primarily with the accumulation of alluvium litter, etc. at hydroelectric stations, determinations of evaporation from the surfaces of the reservoirs, the lack of adequate meteorological observations including snow surveys in a number of regions, etc. *Subject Headings:* **1. Conferences 2. Hydroelectric power stations 3. U.S.S.R.**—*I.L.D.*

7.3–75 551.5:621.311.21

Kraus, E. B., **Meteorology in a large water engineering project.** *Weather*, 10(11):377–382, Nov. **1955. DWB**—Brief account of applications of meteorology to the Snowy Mountains Hydro-Electric project in Australia. It deals with yield of water, estimation of maximum floods, soil conservation, etc. with notes on observation and forecasting. *Subject Headings:* **1. Hydroelectrical engineering 2. Australia.**—*C.E.P.B.*

7.3–76 551.5:6:06

Lissner, Will, **News of weather gains as business.** *N. Y. Times*, July 11, **1955,** Sec. C, p. 25. Also his: **Tips on weather benefit business.** *Ibid.*, July 12, Sec. C, p. 27. **DLC**—An intelligent report on the manifold services provided by private or industrial meteorologists. Four, operating in New York, are named. Fifteen outfits provide professional service throughout the country—the oldest has been operating for 18 years. Weather information is received continually by 345 private concerns who maintain 1100 teletype and 75 facsimile stations. Government and private users maintain 270 drum-type facsimile receivers. Historical weather records are maintained at Asheville, N. C., on IBM cards, and data can be obtained by business interests. *Subject Headings:* **1. Industrial meteorology 2. Private weather services 3. Facsimile map transmission.**—*M.R.*

7.3–77 551.5:62:681.1

Hewson, E. Wendell (*Dept. of Engr., Michigan Univ.*), **Use of high-speed computing methods in the solution of problems in engineering meteorology.** Paper at the NSF-UCLA Conference on the Significance and Possibilities of High-Speed Computing in Meteorology and Oceanography, May 13–15, 1954 in Los Angeles, California. 5 p. 2 refs., eqs. **DWB**—Problems of engineering meteorology such as prediction of spread of ragweed pollen from an area source, or dispersion of gases affected by slope or valley winds, or dynamic loading of structures by turbulent winds, requiring rapid calculation of a large mass of data to get a simple answer, would lend themselves to high speed computing techniques. *Subject Headings:* **1. Engineering meteorology problems 2. High speed computing techniques.**—*M.R.*

7.3–78 551.5:612

U. S. Quartermaster Corps. Research and Development Center. Environmental Protection Div., **Applied Environmental Research Program; First Annual Report, July 1955.** pub. July **1955.** 41 p. 6+figs., tables. **DWB**—This report is a summary of the Environmental Research Program carried on in the Environmental Protection Division of the U. S. Army Quartermaster Research and Development Command. A brief historical sketch is given of the program since its initiation in 1942 and an outline of environmental research program is presented: The Environmental Branch connects three branches, viz.: Environmental Analysis Section, Regional Research Section and Cartographic Section. The current research activity, the future research and a list of recent research reports for the Regional Research and Environmental Analysis sections are presented. The appendix contains the roster of the research personnel of this branch. *Subject Heading:* **1. Environmental physiology.** —*I.L.D.*

## AGRICULTURAL METEOROLOGY

*See also:* **Geographical investigations for agriculture** (Krylov), 7.3-251; **Fourth World Forestry Congress,** 7.3–273.

7.3–79 551.5:63

Nihon Nogyo Kisho Gakkai [Japanese Agro-Meteorological Society], **Nogyo-kisho-shinten.** [Compendium of agro-meteorology.] Tokyo, Yokendo Bk. Co., Ltd., **1954.** 382 p. 228 figs. (incl. photos), tables. In Japanese. **DLC**—Memorial volume on the 10th anniversary of the Society. The 11 chapters, by 36 authors, are entitled: 1. Physics for agricultural engineers, 2. How to use weather forecasting, 3. How to prevent weather damage, 4. Weather and damage from insects and vermin on cultivation, 5. Weather and cultivated vegetables, 6. Weather and sericulture, 7. Character of soil, 8. Micro-meteorology, especially for farming fields, 9 Agriculture and seasons, 10. Weather observations for agriculture and 11. How to obtain and how to use meteorological statistics. Many charts and diagrams are included. *Subject Headings:* **1. Agricultural meteorology 2. Agrometeorological forecasting 3. Japan.**—*M.R., H. Arakawa.*

7.3–80 551.5:63

*Japan. Central Meteorological Observatory, Tokyo, **Annual report of agricultural meteorology, 1954.** pub. Sept. 1955. 97 p. 21 tables. **DWB**—A considerable volume of material, in the form of text, charts, and tables is presented on the following aspects of agricultural meteorology in Japan for 1954: (1) weather conditions in growing stages of rice paddies, (2) of wheat and barley, (3) of other crops; (4) unusual weather conditions (heavy precipitation or strong wind); (5) hours of unfavorable weather for field work (monthly data for 59 stations); (6) weather damage to crops (frost, typhoon, heavy rain—elaborate tables of rainfall in scores of places during several typhoon periods); (7) phenological data (animal p. 42–55, plant p. 56–68); (8) seasonal changes in living conditions, first and last dates of use of mosquito nets, summer clothes, winter clothes, braziers, foot warmers, gloves, overcoats, stoves and swimming for over 60 places in Japan; (9) water temperature and level of rivers used for irrigation and (10) soil moisture (daily at surface, 5, 10, 20, 50, and 100 cm) for Kashiwa, Hiroshima and Kuroiso. A general summary of weather and agricultural conditions completes this imaginative and comprehensive report. *Subject Headings:* **1. Agricultural meteorology 2. Phenology 3. Human activity phenology 4. Typhoon rainfall data 5. Japan.** —*M.R.*

## METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

### METHODS OF OBSERVATION

*See also:* **Principles of met. analysis** (Saucier), 7.3–7; **Numerical methods** (Booth), 7.3–9; **Radio observatories** (Smith-Rose), 7.3–34; **Study & practice of met.** (Geddes), 7.3–44; **Radar tornado tracking** (Bull, Harper), 7.3–162.

7.3–81 551.501:551.551:551.554

Bunker, Andrew F., **Turbulence and shearing stresses measured over the North Atlantic Ocean by an airplane-acceleration technique.** *Journal of Meteorology*, 12(5):445–455, Oct. 1955. 7 tables, 12 refs., 11 eqs. **DWB**—A method of measuring horizontal and vertical wind components from an airplane is described. Turbulence is computed from the root-mean-square components and shearing stress from the cross-products of horizontal and vertical components. Values of shearing stress and turbulence on a number of occasions over the western North Atlantic are presented. "In the lower levels of polar-continental air masses, root-mean-square vertical velocities have been observed to attain 191 cm/sec over land and 120 cm/sec over water, while stresses reached maxima of 16.6 dyne/cm² over land and 3.8 over water. Shearing stresses in the lowest 60 m in the trade winds averaged 0.2 dy/cm² over 7 days, while vertical velocities averaged 26 cm/sec. The influence of atmospheric stability and convective activity upon the turbulent velocities is discussed." *Subject Headings:* **1. Turbulence observation 2. Shear stress 3. North Atlantic.**—*C.E.P.B., Author's abstract.*

7.3–82 551.501:551.551

*Edinger, James G., **Diffusion in the free atmosphere.** California. Univ. at L. A. Dept. of Meteorology, Contract AF 19(122)-464, Final Report, June 1953. 83+30+37 p. 35 figs., numerous tables, refs. p. 61. Appendix 1: Hilleary, Don T., **A captive balloon meteorograph.** (Described and illustrated in detail.) **DWB**—A detailed report of diffusion studies made by means of small soap bubbles (6 cm in diameter) released from a generator attached to a captive balloon floating at about 1000′ above the surface of Harpers Dry Lake in the Mojave Desert of California. The bubbles were followed by a modified Mitchell phototheodolite and the trajectories and stream lines of the air flow were calculated from the resulting motion picture film. Several hundred bubbles were released per minute at a greater height than any meteorological tower and individual paths of the diffusing particles as well as their statistical behavior studied. All of the data as well as the analysis and illustrative diagrams and photographs are presented. Theory is also considered. *Subject Headings:* **1. Soap bubble releases 2. Turbulent diffusion 3. Captive balloons 4. Captive balloon meteorograph 5. Harpers Dry Lake, Calif. I. Hilleary, Don T.**—*M.R.*

7.3–83 551.501:551.510.534

Wulf, Oliver R. (*U. S. W. B. and Calif. Inst. of Techn.*) and Zimmerman, James E. (*Smithsonian Inst., Astrophys. Observ., Calif.*), **A method for the measurement of atmospheric ozone using the absorption of ozone in the visible spectrum.** *Smithsonian Miscellaneous Collections*, Wash., D. C., 123(3), Oct. 27, **1954.** 14 p. 5 tables, 13 refs., 17 eqs. **DLC**—A method is described for determining ozone by measuring the total transmission coefficient on 7 wavelengths (0.722 to 0.470$\mu$), calculating the Rayleigh scattering and approximating to scattering by intermediate and by large haze particles. Allowance for water vapor absorption at 0.57$\mu$ is made if necessary. A rapid procedure for solving the resulting 7 eqs. is described. The coefficients of molecular scattering and of ozone absorption, and sources of error, are discussed and an example of the computation is given. *Subject Heading:* **1. Ozone measurement techniques.**—*C.E.P.B.*

7.3–84 551.501.1:632.187(02)

MacCready, Paul B., Jr.; Schaefer, Vincent J.; Dietrich, John H. and Barrows, J. S., **Project skyfire cloud and lightning observation handbook.** *U. S. Forest Service, Miscellaneous Publication*, No. 5, June **1955.** 47 p. 50 figs. (incl. photos), 8 forms. **DWB**—A cleverly illustrated manual for use by forest lookouts in the Northern Rockies (Montana and Idaho) for determining cloud type, height, direction and speed of movement and location. The information is sketched by the lookout by means of symbols on special cards for quick integration in making regional studies. Cloud photographs made in the region illustrate dozens of general and special types of clouds at all levels, plus pictures of contrails and thunderstorms; nomograms are included for calculating height, distance, direction and speed. Sample forms and cards are also included. Lightning data are reported in detail. *Subject Headings:* **1. Thunderstorm manuals 2. Cloud manuals 3. Project Skyfire 4. Cloud observation 5. Fire weather services 6. Northern Rockies. I. Munitalp Foundation, Inc. II. U. S. Forest Service. Intermountain Forest and Range Experiment Station, Ogden, Utah.**—*M.R.*

7.3–85 551.501.45:519.11

Bilancini, R. (*Rome*), **Sur l'analyse combinatoire des variables météorologiques.** [Combinatorial analysis of meteorological variables.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 2(3):99–104, **1954.** 2 tables, 2 refs., eq. **DWB**—The author presents a method of statistical analysis suitable for investigating the influence of several meteorological factors upon a given phenomenon such as pressure, wind and nebulosity upon rain. The method involves the placing of the variables in two or more classes depending on the values the classes can assume and then examining the number of times, in a long interval, each of the possible combinations of different classes occurs in conjunction with the event being studied. The applications of this method to the rainfall in Rome is shown. *Subject Headings:* **1. Statistical techniques 2. Rainfall data analysis.**—*I.L.D.*

7.3–86 551.501.45:551.521.31

Lonnqvist, Olov, **Synthetic formulae for estimating effective radiation to a cloudless sky and their usefulness in comparing various estimation procedures.** *Arkiv för Geofysik*, Stockholm, 2(12):245–294, **1954.** 5 figs., 15 tables, eqs. **MH-BH**—Synthetic formulas are defined as formulas representing in a simple way the results of a series of quantitative estimates in a way similar to that in which empirical formulas represent observed data. The estimates are made for a series of type atmospheres covering the range of 25 possible variations of temperature and humidity in the atmosphere. The estimation procedures involve the use of radiation charts and numerical methods. The discussion includes a presentation of the formulas of Angström and Brunt, the formula of Robitzsch, the method of Lonnqvist, that of Philipps and radiation charts, the contributions to the effective radiation of the most transparent part of the water vapor spectrum, the true magnitude of the effective radiation, the logarithmic formula for relative net radiation, the linear formula for effective radiation, the illustrative formula for effective radiation, and various estimates compared with observed data. *Subject Heading:* **1. Radiation calculations.**—*I.L.D.*

7.3–87 551.501.45:551.521.11:551.588.2

Thams, J. C., **Zur Bestimmung der Sonnenscheindauer in einem stark kupierten Gelände.** [Determination of sunshine duration in a very mountainous region.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 6(4):417–430, **1955.** 9 figs., 3 tables, 5 refs. German, English and French summaries p. 417. **DWB**—In the Magadino Plain (a deep trough running E–W) the possible sunshine duration was calculated from theodolite measurements at 71 points. Isohels are plotted for the shortest and longest days, separate months and the year. Using the long record for Davos, actual isohels are drawn for June. *Subject Headings:* **1. Sunshine distribution 2. Topographic influences 3. Magadino Plain, Italy.**—*C.E.P.B.*

7.3–88 551.501.7:551.557

Anderson, A. D., **Study of the accuracy of winds derived from transosonde trajectories.** *U. S. Naval Research Laboratory, NRL Memorandum Report,* No. 498, July **1955.** 10 p. 6 figs., 6 refs., eqs. **DWB**—A general method is presented for assessing the accuracy of wind data derived from constant pressure surface balloon trajectories. Data from Moby Dick flight S-85 launched at Minneapolis in Aug. 1953, which was tracked by the Federal Communications Commission's radio direction finding network, is used to estimate the accuracy of the Navy Transosonde winds obtained over the United States. A comparison is made between the accuracy of these trajectory winds and those measured by the GMD A-1 rawin equipment. The use of curve smoothing to increase trajectory wind accuracy is discussed. *Subject Headings:* **1. Wind data accuracy 2. Transosonde trajectories 3. Constant level balloons.**—*Author's abstract.*

7.3–89 551.501.7:551.507.321.2(266)

Goodfellow, W. P., **Pilot balloon ascents carried out by voluntary observers in a Hong Kong selected ship.** *Marine Observer,* 25(170):235–237, Oct. **1955.** photo. **MH-BH**—Hong Kong Observatory staff, and later, ship's officers, made pilot balloon ascents on SS. "Hin Sang." For ascents above 10,000 ft, 100 gm balloons ascending at 700 or 1000 ft/min are required. Plotting observations from a moving ship is described. *Subject Heading:* **1. Pilot balloon ascents at sea.**—*C.E.P.B.*

7.3–90 551.501.7:551.557

Graf, F., **Untersuchungen über die Höhenwindverhältnisse benachbarter aerologischer Stationen.** [Investigations into upper wind conditions at neighboring aerological stations.] *Berlin. Universität. Meteorologisches Institut, Veröffentlichungen,* 3(6), **1940.** 93 p. charts, tables, 3 figs., 43 refs. **DLC**—The reliability of pibal measurements is investigated by comparing ascents reaching 5 km at Hamburg, Hannover and Bremen and at Breslau, Gleiwitz and Dresden. Departures from true wind are due to inaccuracy of assumed rate of ascent and to local wind irregularities. Material is tabulated in 5 groups with errors ranging from <25 to >150% velocity and 0–16 points (0–180°) in direction. In Pt. 2 the relations of these groups to the general weather situations are examined, using charts for surface, 900, 700 and 500 mb levels on selected days. In Pt. 3 the possibility of determining the wind field from high level pressure charts and from surface pressure, temperature and weather is discussed. *Subject Headings:* **1. Upper air wind computation 2. Upper air wind measurement.**—*C.E.P.B.*

## OBSERVATIONAL DATA

*See also:* **Met. data** ([Shaw]), 7.3–2; **Aerometric survey** (Renzetti), 7.3–3; **Night sky & solar radiation obs.** (Herrinck), 7.3–11; **Weather Bur. climatological & hydrological records** (Pinkett et al.), 7.3–12; **Oceanog. data analysis** (Le Floch), 7.3–14; **Arctic expeditions,** 7.3–21; **In the heart of Arctic** (Shcherbakov), 7.3–22; **Atmos. phenomena** (Mich. Univ. Engr. Res. Inst.), 7.3–103; **Synoptic analysis,** 7.3–126.

7.3–91 551.506:551.507.2(261)

*Hamburg. Seewetteramt, **Der Wetterbeobachtungsdienst auf den deutschen Fischdampfern.** [Weather observing service aboard German trawlers.] Hamburg, **1955.** 7 p. 17 charts, t-p. and text in English and German. **DWB**—German trawlers have supplied

weather data since 1932 except for the war period. Eighty-five ships now have meteorological equipment and trained observers (radio operators) and report to Bremerhaven, Cuxhaven, Hamburg and Kiel from locations in North Sea, North Atlantic (to Iceland), and in the Barents Sea. Water temperatures, clouds and waves are now recorded and transmitted. Monthly variations in number of observations (5227 in March, 3355 in June 1954) and number of messages transmitted (2301 in Jan., 1064 in June 1954) is not great. Observations from "Meerkatze," which takes 3-hourly observations, are discussed. Examples of reports on Jan. 17, July 10, and Dec. 15, 1954 and distribution in each month of 1950 shown on charts. *Subject Headings:* **1. Marine meteorological observations 2. German trawlers 3. North Atlantic.**—*M.R.*

7.3–92 551.506.1 (492)

*Denmark. Meteorologisk Institut, **Meteorologisk Årbog, 1952, 1ste Del., Danmark, undtagen Grønland.** [Meteorological Yearbook, 1952, Pt. 1, Denmark excluding Greenland.] Charlottenlund, Trykt i Hørsholm Bogtrykkeri, **1954.** 117 p. almost entirely tables. **DWB**—Thrice daily synoptic observations for 12 2nd order stations in Denmark, and monthly and annual means and frequencies for 42 2nd and 3rd order stations are presented in extensive tables. Values of pressure, temperature, vapor pressure, humidity, wind, visibility cloudiness (0–8), precipitation, sunshine and sea surface temperatures are given for varying numbers of stations. Monthly and annual precipitation data for 160 stations are also included. (For Pt. 1, 1950, *see* 3.10–43, Oct. 1952, *MAB.*) *Subject Headings:* **1. Annual meteorological data summaries 2. Meteorology yearbooks 3. Observational data 4. Denmark.**—*M.R.*

7.3–93 551.506.1 (058) (489)

*Denmark. Meteorologisk Institut, **Meteorologisk Årbog, I Del., Danmark undtagen Grønland, 1953.** [Meteorological Yearbook, 1953, Pt. 1, Denmark, excepting Greenland.] pub. **1955.** 119 p. almost entirely tables. Text and table of contents in Danish and French. **DWB**—Usual tabulation *in extenso* of thrice-daily observation at 12 first order stations in Denmark for 1953, plus monthly and annual summaries for 43 1st and 3rd order stations, monthly and annual mean temperature and annual extremes for more than 160 stations, precipitation data for more than 350 stations, number of hours of precipitation and of sunshine for a dozen stations, daily sea surface temperatures and daily hours of sunshine (for 1 station each), and a summary for Denmark (with normals). (For Pt. 1, 1950, *see* 3.10–43, Oct. 1952, *MAB.*) *Subject Headings:* **1. Annual meteorological data summaries 2. Sea surface temperatures 3. Denmark.**—*M.R.*

7.3–94 551.506.1:627.92 (261.2/3:489)

*Denmark. Meteorologisk Institut, **Nautisk-Meteorologisk Årbog, 1939, II. Del., Meteorologiske Observationer.** [Marine Meteorological Yearbook, 1939, Pt. 2, Meteorological Observations.] Copenhagen, **1954.** 64 p. almost entirely tables. In Danish and English. Also issue for 1940. pub. **1956.** 33 p. **DWB**—Observations at Danish lightships began in 1875 and have remained nearly uniform since 1880. Uniform publication was maintained from 1897–1931. Since 1942 the years 1932–39 have been published, as well as the current years. Data for 6 fixed hours each day for 12 Danish lightships are published *in extenso.* In the 1939 vol. the data include wind direction (16 points), force (12 points), cloud amount (0–10), weather, temperature, hydrometeors, etc. By Dec. 1939 only 9 lightships were reporting and by the end of 1940 only 5. (For Pt. 2, 1935, *see* 3.10–44, Oct. 1952, *MAB.*) *Subject Headings:* **1. Annual meteorological data summaries 2. Marine meteorological data 3. Lightship observations 3. Danish lightships 5. Denmark.**—*M.R.*

7.3–95 551.506.1 (058) (261.2/3)

*Denmark. Meteorologisk Institut, **Nautisk-Meteorologisk Årbog, 1954.** [Marine Meteorological Yearbook, 1954.] pub. **1955.** 171 p. 12 charts. almost entirely tables. In English and Danish. **DWB**—In the current yearbooks, data for 12 lightships and 19 coastal stations are published. In addition to wind, cloud amount, weather and temperature, the visibility (0–9), direction and speed of sea currents, wave or swell, sea temperature and salinity and oxygen content and observations to 40 m depth at light ships are given. Nicely drawn charts show sea surface isotherms for each 1°C in North Atlantic from 50° to 66°N

and from Grand Banks of Newfoundland to 0° long. for each month of 1954. Values for each observation of each day of year are published wherever available, and monthly summaries also provided. *Subject Headings:* **1. Annual meteorological data summaries 2. Marine meteorological data 3. Lightship observations 4. Denmark.**—*M.R.*

7.3–96 551.506.1(994)

*Falkland Islands. Meteorological Service, **Annual meteorological tables, 1953, prepared in conjunction with the Meteorological Office, London.** Stanley, Govt. Print. Off., **1955.** 109 p. almost entirely tables. Price: 10 sh. Inserted, Amendments dated April 1, 1954. Also: **Annual Meteorological Tables, 1952,** (pub. **1953**?). **DWB**—Extensive tables, as for 1950 and 1951, for 7 stations between lat. 51°42′S and 65°15′S, of observational data for 8 fixed hours each day. The stations are Stanley, Falkland Is.; Grytviken, S. Georgia; Signy Is., S. Orkneys; Admiralty Bay and Deception Is., S. Shetlands; and Hope Bay and Argentine Is., Grahamland. In addition to the standard meteorological tables and wind ceiling, visibility and sunshine tables found in 2 previous annual summaries. This manual contains frequency tables of surface pressure in 5 mb ranges, temperature in 2°F ranges, wind to 12 30 degree sectors, upper air temperature to 2°F ranges, wind to 12 sectors, height of pressure surfaces in 50 or 100 ft ranges and upper wind speed for Stanley. (For 1950 and 1951 issues, *see* 4.1 43, Jan. 1953 and 5.1–46, Jan. 1954, *MAB.*) *Subject Headings:* **1. Annual meteorological data summaries 2. Upper air data 3. Observational data 4. Falkland Islands.**—*M.R.*

7.3–97 551.506.1:551.557.36(661)

*French West Africa. Service Météorologique, **Observations en altitude: radiovent.** [Upper air observations: radio winds.] Dakar, March **1955.** unpaged. almost entirely tables. **DWB**—Each page contains frequencies (%) and average speed of wind from each of 8 directions for a month for 1, 2, 3, 6, 9, 12 and 15 km for Abidjan (1953–54), Karak-Ouakam (1949–54) and Niamey (1953–54) where available, plus average monthly frequency and speed for Dakar for 5 or 6 yrs. *Subject Headings:* **1. Upper air wind frequencies 2. Rawin data 3. French West Africa.**—*M.R.*

7.3–98 551.506.1(058)(43)

*Germany. Deutscher Wetterdienst, **Deutsches Meteorologisches Jahrbuch (Bundesrepublik), 1953.** [German Meteorological Yearbook for the Republic, 1953.] Bad Kissingen, **1955.** 214 p. almost entirely tables. 4 charts, (fold.). **DWB**—For the first time since 1939, the meteorological data for all 3 zones of Western Germany are integrated into a single volume, and for the first time the data for the French zone are published. The voluminous yearbook covers 500 1st and 2nd order stations, and over 3300 rainfall stations. Daily or thrice-daily observations of temperature, vapor pressure, relative humidity, wind, visibility (14h), cloudiness, precipitation, snow cover and weather conditions are given by months for 10 stations; sunshine duration for 12 stations; monthly and annual summaries of usual elements for 125 stations; frost and snow cover limits for 140 stations; "ice," frost and "hot summer" days for 140 stations; monthly and annual sunshine summaries for 64 stations; daily sunshine for 20 stations; soil temperature data for 24 stations; phenological observations of several types; daily precipitation for 56 stations, daily snowfall, water content and snow cover for 25 stations; greatest daily snowfall, days with 50 mm or more snow; and a 1 page summary of upper air observations at 8 stations. *Subject Headings:* **1. Annual meteorological data summaries 2. Meteorology yearbooks 3. Western Germany.**—*M.R.*

7.3–99 551.506.1(64)

*Rabat, Morocco. Institut Scientifique Chérifien. Service de Physique du Globe et de Météorologie, **Annales, tome 14, 1948.** [Annals, vol. 14, 1948.] pub. **1955.** 76 p. numerous tables, chart (fold.). List of staff pubs., p. 72–74. **DWB, DLC**—Annual report contains several tables of monthly precipitation, wind and temperature data for numerous stations in Morocco as well as data on waves and swell and earthquakes and magnetic and ionospheric data, a running summary of synoptic conditions and a large, folded annual isohyetal chart for the country. Snowfall data are given for 8 stations in Atlas and other ranges at 1200 1680 m (4000–5600 ft) elev. (For 1934–1942 annuals, *see item* 3A–297, Jan. 1952, *MAB.*)

*Subject Headings:* **1. Annual meteorological data summaries 2. Ionospheric data 3. Morocco.** —*M.R.*

## INSTRUMENT CARRIERS

*See also:* **Oceanog. data analysis** (Le Floch), 7.3–14; **Hist. of aerology** (Keil), 7.3–45; **Pilot balloon ascents . . .** (Goodfellow), 7.3–89; **Marine met. obs.** (Hamburg. Seewetteramt), 7.3–91.

7.3–100 551.507.321.2:551.521.1 551.521.13

*Shackleton, H. R. and Quirk, A. L., **Total solar radiation measurements in the upper atmosphere by balloon-borne pyrheliometers.** Rhode Island. Univ. Upper Atmosphere Research Lab., Contract AF 19(122)-249, Scientific Report, No. 2, June 30, **1955.** 64 p. 18-figs. (incl. photos), 11 table, 10 refs. **DWB**—This report summarizes the balloon phase of the program directed toward the measurement of the intensity of solar radiation in the upper atmosphere. A balloon-borne instrumentation employing Eppley global pyrheliometers as solar radiation receivers is described. Data are photographically recorded at half-minute intervals throughout the duration of the balloon flights. The helium-filled balloons, 85 to 90 ft in diameter, attain altitudes in the order of 90,00 ft where atmospheric scattering and absorption of radiation is negligible thus permitting direct measurements to be made. Eight flights were undertaken during 1951/54 with this type of instrumentation of which four yielded usable data. A value of 1.96 langleys per min, based on the Smithsonian scale of radiation of 1934, is obtained, with a probable error of two%. *Subject Headings:* **1. Balloon soundings 2. Solar radiation measurement 3. Solar constant.**—*Authors' abstract.*

7.3–101 551.507.352

**New 180-mile rocket.** *Science News Letter*, Wash., D. C., 67(18):275, April 30, **1955. DLC**—The Aerobee-Hi rockets, of which 22 will be launched in the International Geophysical Year, 1957–1958, are designed to carry 150 lbs of scientific instruments 180 mi into the air. High altitude air samples will not be contaminated by gases from the pressure-sealed, leak-free rocket. The new rocket costs only one-tenth that of the larger Viking rockets. *Subject Headings:* **1. Aerobee rockets 2. High altitude research.**—*W.N.*

7.3–102 551.507.362:551.510.53

Appleton, Sir Edward, **Rocket sounding in the upper air: confirmation of results inferred from radio measurements.** *Wireless World*, London, 61(9):406–407, Sept. **1955.** 4 eqs. **DLC**—In connection with plans for the International Geophysical Year, the article briefly describes methods of measuring pressures and deducing temperatures, and of measuring electron density at a given height by the Doppler effect on the phase velocity of radio waves near the rocket emitter. *Subject Headings:* **1. Rocket instrumentation 2. Ionospheric electron density measurement.**—*C.E.P.B.*

7.3–103 551.507.362:551.506.7

*Michigan. Univ. Engineering Research Institute, **Atmospheric phenomena at high altitudes.** Contract DA-35-039 SC-15443, Project 3-99-07-22, Project SC 172B, Progress Report No. 7, Quarterly Report, July 1-Sept. 30, **1953.** 18 p. 16 figs. **DWB**—Description of operations attending the firing of sphere Aerobee Rocket SC-31 (at White Sands, Sept. 29, 1942 at 1349h) which reached 250,000 ft (sphere was ejected prematurely at 190,000 ft) instead of predicted 400,000 ft. Chart shows computed density and temperature data for SC-29 fired previously. Above 200,000 ft the data scatter considerably (100° to 500°K and $10^{-7}$ to $10^{-8}$ slugs/cu ft at the same approx. altitude). Pictures show equipment before and after recovery (the sphere of SC-31 was not recovered). *Subject Headings:* **1. Rocket observation data 2. Aerobee observations 3. Sphere aerobees 4. White Sands, N. Mex.**—*M.R.*

## INSTRUMENTS

*See also:* **Radar storm detection equip.** (U. S. AWS), 7.3–70.

7.3–104 551.508.26:536.5

Teddington, England. National Physical Laboratory, **Calibration of temperature measuring instruments.** Its *Notes on Applied Science*, No. 12, **1955.** 47 p. 27 figs., 4

tables. **DWB**—The difficulties of finding an absolute temperature scale are set out and the International Temperature Scale (−200 to +2000°C) defined (more fully in Appendix). The method of realizing the 6 fixed points is described. The primary standards are the platinum resistance thermometer (−182.97 to +630.5°C), and the thermocouple and optical pyranometer for higher temperatures; liquid-in-glass thermometers are used as working standards. The routine testing of various types of thermometer is described, including comparison baths using acetone, water or oil. *Subject Headings:* **1. Instrument calibration 2. Thermometers.**—*C.E.P.B.*

7.3–105 551.508.25:551.521.4:551.521.64:551.521.9

Jelley, J. V., **Čerenkov radiation and its applications.** *British Journal of Applied Physics*, 6(7):227–232, July **1955.** 6 figs., 28 refs. **DLC**—The theory of this faint bluish-white radiation from strong sources of $\beta$ and $\gamma$ radiation is set out. Practical applications of the Čerenkov counter are described. The studies of pulses associated with air (Auger) showers at Harwell and later Pic-du-Midi are summarized, including work not yet published. The pulse-height distribution is $N(>h) \propto h^{-1.6}$; $N(Z)$ varies as $\cos^2 Z$ or $\cos^3 Z$. No limitation to points of the sky could be found. *Subject Heading:* **1. Čerenkov radiation.**—*C.E.P.B.*

7.3–106 551.508.25:551.521.64

Subramaniam, A. (*Tata Inst. of Fundamental Res., Bombay*), **A cosmic-ray shower selecting circuit.** *Journal of Scientific and Industrial Research, New Delhi, Sec. B*, 14(2):85–86, Feb. **1955.** fig., 2 refs. **DWB**—The circuit described and diagrammed here is useful in selecting cosmic ray showers. The mode of connecting all G.M. counters parallel in each tray will enable recording of two or three particles traversing the same set of parallel counters. Also, a minimum number of coincident discharges in the individual tray together with those simultaneous in other trays are detected. *Subject Headings:* **1. Cosmic ray showers 2. Cosmic ray instruments.**—*W.N.*

7.3–107 551.508.25

Wörner, H., **Die Konstanz von Selenphotoelementen.** [The constancy of selenium photoelements.] *Zeitschrift für Meteorologie*, 9(8):248–250, Aug. **1955.** table, 2 refs. **DLC**—The constants of 8 photocells were determined in 1953 and 1955 and showed large changes (up to >30%), which differed greatly from one cell to another, though some general tendencies could be seen. The changes were due to aging as well as use. *Subject Heading:* **1. Photoelectric cells.**—*C.E.P.B.*

7.3–108 551.508.26

Haenni & Cie, Jegenstorf, **Thermomètres à mercure ou à tension de vapeur?** [Mercury or vapor pressure thermometers?] *Nouvelles de Haenni*, No. 55, May/June **1955.** 4 p. 8 figs. **DWB**—A mercury thermometer illustrated in the Haenni catalog does not appear to be different from a vapor pressure thermometer. The mercury thermometer has a range from −30° to +600°C. The vapor pressure thermometer can be made very sensitive in the range −30°C to +100°C, or by a slight adjustment, at lower or higher temperatures. Specifications of various types of thermometers, and advantages of each are given in a table. *Subject Headings:* **1. Thermometers 2. Vapor pressure thermometers.**—*M.R.*

7.3–109 551.508.26:551.525.4

Rider, N. E., **An instrument for the continuous recording of soil temperatures at a number of depths.** *Meteorological Magazine*, London, 84(1001):329–332, Nov. **1955.** 3 figs., 4 refs. **DWB**—A tiefnol tube closed at ends by a brass spike and brass cap, and driven vertically into the soil, has 3 copper plugs at each depth (1, 5, 10, 20, 40 cm) carrying copper-constantan junctions wired to junction boxes and standardized by an ice flask (wiring diagram given). Power is supplied by a 6 V accumulator. It gives a record at each depth once in 12 min. Three sets have been exposed at Cambridge, Eng. for a year without developing faults. *Subject Heading:* **1. Soil thermometers.**—*C.E.P.B.*

7.3–110 551.508.29:536.53

Dauphinee, T. M., **Apparatus for comparison of thermocouples.** *Canadian Journal of Physics*, Ottawa, 33(6):275–285, June **1955.** 9 figs., 2 refs. **DWB**—This paper describes a

semiautomatic apparatus for routine or precision comparisons of thermocouples of the same type in the temperature range 0–1100°C. The couples being compared are welded together at the tips and placed in a tube furnace which is heated at rates varying from 10 to 100°C/min. Measurements of carefully annealed thermocouples show that in the temperature range 300–1100°C platinum-platinum 10% rhodium thermocouple comparisons may be made to accuracies of $\pm 0.3\mu$v ($\pm 0.03$°C) at heating velocities as great as 15°C/min. while accuracies of $\pm 1.5\mu$v at velocities of 100°C/min. are feasible. The furnace temperature is varied by means of a motor-driven variac with automatic reversal at peak temperature. In addition to this standard comparison procedure, provision is made for comparing corresponding elements of the couples, for suppression of all or part of the measured emf, and for measuring the whole emf of all couples when a comparison of different types is desired. The system can be adapted to X Y recording with total emf plotted against emf differences. *Subject Heading:* **1. Thermocouple comparisons.**—*Author's abstract.*

7.3–111 551.508.29:536.53

Dauphinee, T. M. and Woods, S. B. (*Div. of Physics, Nat. Res. Council of Canada*), **Low-level thermocouple amplifier and a temperature regulation system.** *Review of Scientific Instruments*, N. Y., 26(7):693–695, July **1955.** 5 figs., 3 refs. **DWB, DLC**—A breaker-type dc amplifier for measurement of thermocouple voltages as low as $10^{-2}\mu$volt is described. Mechanically driven "choppers" operating at 40 cps are used to modulate the thermocouple signal and later demodulate the amplifier output. Both input and output are floating and may normally be operated connected to ungrounded circuits. Over-all voltage gain is approximately $10^7$ while the zero error corresponds to less than $10^{-2}\mu$volt dc input within five minutes of turning on. The amplifier contains only standard components and details of a suitable chopper which can be made in the laboratory are given. A temperature regulation circuit is described which is suitable for precision control of temperature in conjunction with a differential thermocouple. An indicated temperature match as close as 0.0002°C has been obtained with a single couple. *Subject Heading:* **1. Thermocouple amplifiers.**—*Authors' abstract.*

7.3–112 551.508.8

Haenni & Cie., Jegenstorf, **Thermo-hygrographe miniature Haenni fig. 701.** [Haenni miniature hygro-thermograph fig. 701.] *Nouvelles de Haenni*, No. 52, Oct./Dec. **1954.** 4 p. 11 photos. **DWB**—A compact hygrothermograph which has a range from 20% to 100% relative humidity and a temperature range from 15° to 40°C or 30° to 55°C, but can be made to register from 0° to 80°C. It is easily adjustable. Parts are shown in detail in 11 photographs. The method of adjusting and reading is described. *Subject Heading:* **1. Hygrothermographs.**—*M.R.*

7.3–113 551.508.822

Handcock, D. E. (*Australian Weather Bureau, Melbourne*), **Effect of solar radiation on radio sonde temperature measurements.** *Australian Meteorological Magazine*, Melbourne, No. 4:5–14, Aug. **1953.** 5 figs., table, 6 refs., eqs. **DWB**—U. S. Weather Bureau studies (1947) indicate cause of radiation error on ascent in stratosphere was due to top of box (not element) being heated so hot air passes through duct. On descent only fresh air passes over element. Theory is outlined and modification for Australian conditions (higher sun angle) expressed. Difference of error determined by (a) theory and (b) nomograms provided by U. S. Weather Bureau, was 0.5°C at 100 mb for 275 m/min ascent rate A detailed table and nomograms are presented for summer and winter ascents at Darwin, Guildford and Hobart for rates of ascent from 200–400 m/min for 60, 80, 100, 200 and 300 mb expressed in height and in °C temp. Errors as high as 5.5°C can occur. *Subject Headings:* **1. Radiosonde errors 2. Radiation error of radiosonde 3. Australia.**—*M.R.*

7.3–114 551.508.822:551.524.7

†*Rossi, Veikko (*Finnish Met. Office, Helsinki*), **On the solar radiation error of the different radiosondes.** *Geophysica*, Helsinki, 4(4):195–202, **1954.** 4 tables, 10 refs. eq. **DWB**—Analysis of results of the Payerne, Switzerland radiosonde comparisons (May 1950) shows

that the Finnish radiosonde has the largest radiation error, the French 40–60% and the American 30% that of the Finnish. The British radiosonde has a fairly constant error, whereas the Finnish, French, Swiss, German and U. S. sondes increase in error with height. The Swiss, German and U. S. sondes show little error below 100 mb, United Kingdom below 200 mb. *Subject Headings:* **1. Radiosonde comparisons—1950 2. Radiosonde errors 3. Radiation error of radiosondes.**—*M.R.*

7.3–115 551.508.822:551.508.43

*Suzuki, S.; Kaneko, M.; Makino, H. and Nakano, M., **Experiments on the effect of low temperature on the pressure measurements by Japanese radiosonde, CMO-S50.** *Tateno, Japan. Aerological Observatory, Journal,* 5(4):345–352, March **1954.** 3 figs., 5 tables, 4 refs. In Japanese; English summary p. 345. **MH-BH**—Ten aneroids for each of the two types of Japanese Radiosonde (L and M) were tested in a vacuum in a cold chamber. The aneroids are made of phosphor-bronze and German silver, respectively. Results are shown in tables and graphs for 1000 to 20 mb and 10°C to −40°C. The altitude difference due to calibration errors at constant pressure level (400, 250 and 50 mb) and at constant temperature (−51.9°C) are also shown. *Subject Headings:* **1. Radiosonde errors 2. Aneroid capsule errors 3. Japanese radiosondes 4. Temperature corrections on aneroids.**—*M.R.*

7.3–116 551.508.822:621.396.663

Väisälä, V., **A new method of radio direction finding designed especially for the Finnish (Väisälä) radiosonde.** *I.U.G.G. Association of Meteorology, Brussels,* 1951, *Procès-Verbaux des Séances, Mémoires et discussion,* pub. **1953.** p. 164–167. fig. **DWB**—Two pairs of vertical antennas are situated at the corners of a square with a diagonal of 125 m. Azimuth and elevation angle can be determined by the phase difference of two antennas. The random instrumental error is ±0.1°. A probable systematic error is the subject of investigation. *Subject Headings:* **1. Radio direction finders 2. Radiosondes 3. Väisälä radiosonde.** —*A.A.*

## SYNOPTIC ANALYSIS AND FORECASTING

*See also:* **Principles of met. analysis** (Saucier), 7.3–7; **Numerical methods** (Booth), 7.3–9; **South Pole Seabee operations,** 7.3–25; **Frontal analysis** (Anderson et al.), 7.3–167; **Drought forecasting** (Gōda), 7.3–234.

7.3–117 551.509

U. S. Hydrographic Office, **Radio weather aids, 1954.** Edited by the Naval Aerological Service, Chief of Naval Operations, U. S. Navy. Its *H.O. Publication,* No. 206, **1955.** 2 v. v. 1, **General weather information, broadcasts schedules.** v. 2, **Codes, code forms, international index numbers, miscellaneous.** each section separately paged. forms, tables. Price: $3.00 per vol. **DWB**—Contains voluminous tables of information for those wishing to receive weather reports or forecasts by radio. It is based on information available July 1, 1954 on schedules of weather broadcasts from various countries, arranged in 3 categories: Marine, Synoptic and Aviation. Broadcasts are alphabetized under country or area and countries under continents or major areas. In vol. 2 weather codes and specifications of all types are indexed and presented in full, together with International Index Numbers of all stations in the world, conversion tables, location charts, etc. *Subject Headings:* **1. Radio weather broadcasts 2. WMO. codes and specifications 3. International index numbers 4. International synoptic networks I. U. S. Naval Aerological Service.**—*M.R.*

7.3–118 551.509.1(02)

Great Britain. Meteorological Office, **International meteorological code adopted by the International Meteorological Organisation, Washington, 1947. Decode for the use of shipping. Incorporating the Code for weather reports from and to ships and the analysis code for use of shipping.** London, H.M.S.O., **1955.** *M.O.* 509 (3rd ed.). 44 p. fold. plate, numerous tables. **GB-MO**—This handbook (Price: 1s/6d) gives the codes for reports from ships and

land stations, with analysis tables, tables for finding dew point, etc., and notations for plotting on weather charts. A section deals with the Atlantic Weather Bulletin for Shipping (Great Britain) with map of areas in E. Atlantic and a specimen plotted chart. *Subject Headings:* **1. Code manuals 2. International meteorological codes 3. Marine meteorological code, 1949.**—*C.E.P.B.*

7.3–119 551.509.1:621.396:001

Hornstein, R. A., **Report on questionnaire distributed for purpose of determining public requirements and desires re weather forecast services.** *Canada. Meteorological Div., Dir-*2522, Pub-175, Aug. 9, **1954.** 12 p. **DWB**—A questionnaire was sent to 353 people in 4 Maritime Provinces, and 285 replies were received (265 from the radio audience) in an attempt to determine public preference as to certain features of weather forecast and summary terminology. The answers indicated that: 1) temperature forecasts should be issued to the greatest possible degree of exactness, 2) overcast and cloudy should retain distinctive meanings, 3) in case of doubt, the forecaster should indicate doubt but still state his own convictions honestly and not be "pessimistic" or "optimistic," etc. Winds should be indicated in forecasts in any event. *Subject Headings:* **1. Forecast terminology 2. Radio weather broadcasts.**—*M.R.*

7.3–120 551.509.1

International Civil Aviation Organization, **Meteorological codes: annex 3 to the Convention on International Civil Aviation.** 3rd ed. Jan. **1955.** 26 p. At head of t-p: International Standards and Recommended Practices. "Supersedes, Jan. 1, 1955, all previous editions of Annex 3." **DWB**—Rules effective Jan. 1, 1955 for transmission of synoptic reports, analyses, forecasts, aircraft and airport reports, flight forecasts, and exchanges thereof. Codes such as POMAR and AIREP and notes on their use are set forth with specifications. *Subject Headings:* **1. International Meteorological codes 2. Aeronautical meteorology codes.**—*M.R.*

7.3–121 551.509.1:621.39

Ockenden, C. V., **Communications and electronics in meteorology.** *British Communications and Electronics*, 1:58–63, Aug. **1955.** 6 figs. **DBS**—A lucid and informed description of the collection of synoptic data and the Meteorological Office Telecommunications Centre at Dunstable. Teleprinter landline networks in western Europe are now interconnected. Collection of N. American data by radioteletype, ships' reports, etc. are described. The use of facsimile systems such as MUFAX for transmitting charts is illustrated. The part played by electronics in receiving radiosonde and radar upper air data, thunderstorm location and radar echoes from lightning is summarized. Finally, a brief mention is made of experimental high speed computing for weather prediction. *Subject Headings:* **1. Communication networks 2. Synoptic networks.**—*C.E.P.B.*

7.3–122 551.509.1(02)

U. S. Air Weather Service, **Weather message contents handbook.** Its *Air Weather Service Manual* 105-2, Pt. 8, Jan. 1, **1955.** each section repaged. "Supersedes *AWS Manual* 105-2, Pt. 8, July 20, 1953." **DWB**—Rules and information for communications personnel and others preparing and processing weather reports and collections for distribution over communications facilities of the U.S.A.F. in the 1st Weather Wing. *Subject Headings:* **1. Weather message manuals 2. Communication manuals.**—*M.R.*

7.3–123 551.509.25

U. S. Air Weather Service, **Fjørtoft's graphical method for preparing 24-hour 500-mb prognostic charts.** Its *Technical Report*, No. 105–131, April **1955.** 11 p. 3 figs., table, eqs. **DWB**—The results of a verification of the Fjørtoft prognostic procedure are presented and it is concluded that objective use of the graphical method of Fjørtoft produces 24-hour 500-mb prognostic charts quantitatively similar to those produced by skilled forecasters in a weather central. The complete procedure of Fjørtoft's method is outlined. *Subject Headings:* **1. Prognostic chart preparation 2. Graphical presentation.**—*I.L.D.*

7.3–124 551.509.3:519.24:551.509.53

Evjen, Sig., **Statistik varsling av middelverdier.** [Statistical forecasting of mean values.] *Naturen*, 79(6):162–183, **1955.** 2 figs., 5 tables, 7 eqs. **DLC**—Some fundamental problems of statistical forecasting are demonstrated and discussed. BIRKELAND and FÖYN's monthly and annual mean values of temperature at Stockholm and Edinburgh, 1776–1926, are classified into positive and negative deviations from the mean value to check persistence which was subsequently tested by the law of probability. The negative results were re-tested by dividing the deviations into 4/10° which then gave a very smooth normal curve when based on the computed standard deviation $\sigma$ expressed by $\sigma=\sqrt{\frac{\Sigma v^2}{N}}$ shown in a histogram. Correlation between deviation from monthly mean for the months Feb. and March 1776–1925 at Stockholm is presented graphically to demonstrate applications and limitations of three rules derived for temperature forecasting. Tabulated data of persistence and frequency (%) of uniform temperature deviations for monthly values (1776–1925) are given for Stockholm and Edinburgh. The standard deviation in °C computed for each month in the period 1901–1930 is tabulated for six Norwegian stations. It is concluded that investigation of meteorological elements other than temperature will contribute to improved determination of location and extent of the confidence region of statistical forecasting. *Subject Headings:* **1. Statistical forecasting 2. Temperature forecasting 3. Stockholm, Sweden 4. Edinburgh, Scotland.**—*W.N.*

7.3–125 551.509.3

Sutton, Sir Oliver Graham, **Weather forecasting: the future outlook.** *Nature*, London, 176(4491):993–996, Nov. 26, **1955. DWB**—An important statement by the Director of the British Meteorological Office. A brief history of weather forecasting in Britain is followed by a summary of the 3-dimensional principles in use to-day. The 3 great problems are to improve: 1) the forecast of the general situation (prebaratic); 2) local forecasts for 6, 12 or 24 hours; 3) long range forecasts. Progress in 1) is slow or nil but may be improved by high speed electronic methods, which in 10–20 years may eliminate major errors in forecasts. For 2) quick, accurate and frequent reporting is required plus scanning by radar. The major difficulty in 3) is that influences below the threshold of observing can become dominant in a few days, so that future weather seems indeterminate. There is at present no real basis for reliable forecasts of a month or season, either by statistical or dynamical methods. *Subject Heading:* **1. Forecast improvement.**—*C.E.P.B.*

7.3–126 551.509.31:551.585:551.506.2(595)

Watts, I. E. M., **Methods of synoptic analysis at low latitudes.** *Royal Meteorological Society, Quarterly Journal*, 81(350):582–587, Oct. **1955.** 4 figs., 17 refs. **DWB**—The apparent differences in the methods of synoptic analysis employed in the tropical Pacific and in equatorial S.E. Asia represent nothing more than adaptations of the same technique. Over the Pacific it is unusual for two different airstreams to meet at a large angle and, since their common boundary cannot be traced from day to day with continuity, reliance must be placed on recognition of short-lived asymptotes and vortices from the instantaneous streamlines. Over equatorial S.E. Asia, long semipermanent boundaries can be traced with continuity owing to the persistence of the westerlies. The difference of opinion as to the most desirable method of analysis is mainly due to the variations in horizontal extent of the equatorial westerlies in different longitudes. At the boundary between the trades and the westerlies there are separate centres of rainfall rather than a continuous rain-band. The paper is illustrated by a number of diagrams of upper winds at Singapore and other stations. *Subject Headings:* **1. Synoptic analysis 2. Tropical weather forecasting 3. Southeast Asia.**—*Author's abstract.*

7.3–127 551.509.312:518

Hinkelmann, Karl and Schwarzenberger, Rudolf, **Charakteristikenverfahren in der numerischen Wettervorhersage.** [Method of characteristics in numerical forecasting.] *Germany. Deutscher Wetterdienst, Berichte*, 2(14), **1954.** 26 p. 24 figs., 17 refs., eqs. **DWB**

—Modern methods for the numerical solution of a system of partial differential equations are discussed and further developed for the needs of numerical weather forecasting. It was necessary to analyze problems in higher dimensions than was done before for hydrodynamic applications. The characteristic initial value problems are developed. The advantages of the new method is that the solutions can be computed more conveniently and with better control of errors in numerical integration. It is shown how to simplify the basic three equations of motion, the equation of continuity and the first thermodynamic theories in order to get workable systems of differential equations. This is done partly by sacrificing important aspects. The whole treatment is highly theoretical, no practical examples are shown as yet. *Subject Headings:* **1. Numerical forecasting 2. Hydrodynamics 3. Mathematical techniques.**—*A.A.*

7.3–128 551.509.312:551.511

†Landers, Holbrook, **A three-dimensional study of the horizontal velocity divergence.** *Journal of Meteorology*, 12(5):415–427, Oct. **1955.** 12 figs., 9 tables, 23 refs., 5 eqs. **DWB**—The supposed level or surface of non-divergence about 600 mb was investigated by 3-dimensional wind models, 2000–25,000 ft, over eastern U. S. at 3 h and 15 h GCT on March 22–25, 1951, and by constructing divergence maps. No level of nondivergence was found, but a level of least divergence was located at average height 6000–10,000 ft (mean 7800 ft). Space and time variations are examined. Clear diurnal effects were found, divergence being weaker at 15 h than 3 h. The average was $1.5\times10^{-5}$ $sec^{-1}$, previous estimates are compared. The results are checked by comparison of computed vertical velocities with surface analysis, precipitation and tendency. *Subject Headings:* **1. Divergence analysis 2. Level of nondivergence.**—*C.E.P.B.*

7.3–129 551.509.312

White, Robert M. and Palson, William C., Jr., **On the forecasting possibilities of empirical influence functions.** *Journal of Meteorology*, 12(5):478–485, Oct. **1955.** 4 figs., 4 tables, 6 refs., 17 eqs. **DWB**—The possibilities of using empirical functions derived from a 45-point grid (levels of 1000, 500 and 200 mb surfaces at 15 stations irregularly spaced over N. America) are explored. A series of 125 independent forecasts of deviations of levels from normal 1, 3 and 5 days ahead gave correlations with observed values: 1000 mb, 0.76, 0.56, 0.52; 500 mb, 0.83, 0.63, 0.57; 200 mb, 0.83, 0.66, 0.59. The method appears to be adequate for 24 hr forecasts, but for longer forecasts it may be necessary to develop more complex systems. *Subject Headings:* **1. Numerical forecasting 2. Empirical influence functions.**—*C.E.P.B.*

7.3–130 551.509.33

Namias, Jerome, **Long-range weather forecasting.** *Scientific American*, New York, 193(2):40–44, Aug. **1955.** 6 charts, photo. **DLC**—A nontechnical account of the development of and principles underlying 5-day and 30-day weather forecasts. The role of the long waves in controlling the movement of air masses and patterns of air flow and examples of resulting weather are discussed. The utilization of electronic computers and punched card machines in long range prediction is outlined and the nature of the 5-day and 30-day forecast is described. *Subject Headings:* **1. Extended forecasting 2. Long range forecasting.**—*I.L.D.*

## STRUCTURE AND COMPOSITION OF THE ATMOSPHERE

### COMPOSITION OF THE ATMOSPHERE

*See also:* **Aerometric survey** (Renzetti), 7.3–3; **Particle trajectories** (Pasquill), 7.3–211; **Dust removal by rain** (Armour Res. Foundation, Chic.), 7.3–239.

7.3–131 551.510.4:551.593.5

Deirmendjian, Diran, **The optical thickness of the molecular atmosphere.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(4):452–461, **1955.** fig., 3 tables, 18 refs., 9 eqs. English, German and French summaries p. 452–453. **DWB**—The Rayleigh

extinction formula is modified to apply to a stratified atmosphere. Data are tabulated for density and composition ($N+O$) up to 100 km and the extinction coefficient calculated for 375, 520 and 835 m$\mu$. The optical thickness above each height is then calculated for these wave-lengths. Some calculations of Jan.–July variation are made for San Diego and St. Paul. Further research is suggested. *Subject Heading:* **1. Atmospheric extinction.**—*C.E.P.B.*

7.3–132 551.510.41:546.214

*Dobson, G. M. B.; Normand, C. W. B. and Kay, R. H., **The determination of atmospheric ozone by measurements on moonlight.** *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances. Mémoires et discussion*, p. 384–388. pub. **1953.** table. **DWB**—The new Dobson spectrophotometer with a photomultiplier allows accurate ozone observations in moonlight. Eleven measurements made at Oxford are presented. Tropical and high altitude observations are suggested to determine the extra-terrestrial constant $L_0$ for the moon. *Subject Headings:* **1. Moonlight ozone data 2. Ozone measurements 3. Spectrophotometric ozone determination 4. Oxford, Eng.**—*A.A.*

7.3–133 551.510.41:546.214

Dobson, G. M. B., **Summary [of Symposium on Atmospheric Ozone].** *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Mémoires et discussion*, p. 400–401. pub. **1953. DWB**—Emphasizes lack of adequate knowledge. Rocket measurements with simultaneous ground observations of ozone might be useful to check mathematical derivations. *Subject Heading:* **1. Ozone measurements.**—*A.A.*

7.3–134 551.510.41:523.43

†Grandjean, J. and Goody, R. M. (*Imperial College, London*), **The concentration of carbon dioxide in the atmosphere of Mars.** *Astrophysical Journal*, Chicago, 121(2):548–552, March **1955.** 2 tables, 13 refs., 4 eqs. **DLC**—From observations of carbon dioxide bands in the spectrum of Mars made by G. P. KUIPER, we have redetermined the fraction by volume of this gas in the planet's atmosphere, taking into account the fine structure of the band and the shape of the rotation lines. If the ground-level pressure on Mars is 100 mb, we find that the fraction by volume of carbon dioxide is 50 times greater than in the earth's atmosphere. *Subject Headings:* **1. Carbon dioxide in the atmospheres of planets 2. Mars 3. Planetary atmospheres.**—*Authors' abstract.*

## ATMOSPHERIC POLLUTION

7.3–135 551.510.42:351

**Atmospheric pollution in Britain.** *Nature*, London, 176(4489):891–893, Nov. 12, **1955. DWB**—Leading article on the Clean Air Bill now before Parliament. Topics discussed are that there are too many escape clauses, the need for further research and public education. *Subject Heading:* **1. Atmospheric pollution control.**—*C.E.P.B.*

7.3–136 551.510.42:628.53

Best, A. C., **Maximum concentration at ground level of gas from a heated elevated source.** *Meteorological Magazine*, London, 84(1000):297–300, Oct. **1955.** table, 4 refs., 7 eqs. **DWB**—The maximum concentration at ground level of a heated plume of smoke which becomes level at a height $z$ above the top of the stack is discussed, $z$ having the form $B/U^5$ ($U$=wind speed). Three formulas (Sutton; Bosanquet, Carey and Hilton; Oak Ridge) tested for 48 different parameter values gave differences which were mostly relatively unimportant. The factors of safety and convenience favor the Oak Ridge formula which gives maximum concentration (mg/m$^5$) as $9\times10^3Q/h(14\ vd+H)$ where $Q$ is strength of source (lb/sec), $h$ height of stack (ft), $v$ speed of efflux (ft/sec) and $H$ heat output (British thermal units/sec) relative to air temperature. *Subject Heading:* **1. Smoke plumes.**—*C.E.P.B.*

7.3–137 551.510.42:551.551

Edinger, James G. (*Dept. of Met. Univ. of Calif.*), **On the dispersal of large particles in the atmosphere.** *American Meteorological Society, Bulletin*, 36(5):211–215, May **1955.**

5 figs., 3 refs. **DWB**—A kinematical investigation of the dispersal of large particles in th atmosphere, that is particles significantly large so as not to partake of Brownian movement The relation between particle dispersal and flow pattern is discussed with reference to particle subjected to constant horizontal velocity in each horizontal plane but with a linear increas of velocity with height, and particles introduced into a circular vortex with radial shear an for particles under conditions in which the velocity field changes with time. Also the use c mean quantiles as measures of particle dispersal is analyzed by considering the effects c atmospheric motion under conditions in which the scale of motion is less than the linea dimensions of a cloud of particles and in which the scale of motion is equal or greater. *Subjec Heading:* **1. Dispersion of particles.**—*I.L.D.*

7.3–138 551.510.42:551.575.

*†Faith, W. L., **Combustion and smog: the relation of combustion processes to Los Angele smog.** *Air Pollution Foundation, Los Angeles, Report* 1(2), Sept. **1954.** 63 p. 30 table 33 refs. **DWB**—This report constitutes critical summary of available information on the rol of combustion gases in the formation of smog. The discussion covers the role of natura gas and fuel oil, the role of auto exhaust gases, analysis of Los Angeles atmosphere for hydro carbon and ozone formation, plant damage, eye irritation, reduced visibility, the rol of Diesel fuels burned by trucks and buses and the role of refuse incinerators. *Subject Headings:* **1. Smog 2. Los Angeles, Calif.**—*I.L.D.*

7.3–139 551.510.42

Hitchcock, Lauren B. and Marcus, Helen G. (*both, Air Pollution Foundation, Los Angeles*) **Some scientific aspects of the urban air pollution problem.** *Scientific Monthly,* Washington 81(1):10–21, July **1955.** 4 figs. (incl. photos), 5 tables, 8 refs. **DLC**—A long semitechnica article covering the general aspects of atmospheric pollution and control (i.e. at Los Angeles) instrumentation and analysis, control by reduction at source, by dilution at source, by lan use (city planning) taking weather conditions into account; control devices; analysis of exhaus gases and factory emissions, physiological and botanical effects, and 15 suggestions for futur research. At least half of these are meteorological by nature. *Subject Headings:* **1. Ai pollution control 2. Los Angeles.**—*M.R.*

7.3–140 551.510.42

†*Kluge, Mieczysław, **Zapylenie atmosfery w Lublinie, na podstawie obserwacji prze prowadzonych w roku 1953.** [Air dustiness at Lublin on the basis of observations conducte in 1953.] *Lublin. Universytet Marii Curie-Skłodowskiej, Roczniki, Annales, Sec. B,* 8(5):263 309, **1953.** 3 tables, 14 figs., 33 refs. Russian and English summaries p. 300–309. **DWB** The investigation based on daily observations at 12:30 p.m. during 1953 with an Owens dus counter at the meteorological station of Lublin University dealt with the dependence of th degree of dustiness on relative humidity, wind directions and velocity, visibility (transparency of the air) and air pressure. The results of the study showed that: 1) dustiness in Lublin i not high; 2) it is influenced in great measure by the number of fire places in dwellings an factories and the street traffic (dust of advective origin plays a lesser part); 3) the dependenc of air dustiness on meteorological elements has been ascertained in a small percentage of case This can be explained by the fact that observations were conducted in the center of the cit where the suspended particles of local origin prevailed. Many tables and graphs illustrat the results of this detailed investigation. *Subject Headings:* **1. Dust content of air 2. Owen dust counter 3. Dust haze 4. Lublin, Poland.**—*A.M.P.*

7.3–141 551.510.42:551.55

Poncelet, Lucien, **Les aspects météorologique et climatologique des pollutions atmos phériques.** [Meteorological and climatological aspects of atmospheric pollution.] *Belgium Institut Royal Météorologique, Contribution,* No. 16, **1954.** 15 p. 4 figs., tables, 4 eqs. **DW** —The author discusses the normal composition of the atmosphere and the natural aerosols and the wind structure near the ground with particular reference to the roles of mechanica

and chemical turbulence, and presents the fundamental formulas for calculating pollution from a single source and their use for determining concentration of pollutants for different wind conditions and thermal gradients and for mean conditions. The application of meteorological principles to reducing the rate of pollution is considered and an example indicating the distribution of $SO_2$ pollutants around an emission point as a protection and of frequencies, direction and speeds and degree of turbulence is presented. *Subject Headings:* **1. Atmospheric pollution 2. Turbulence effects.**—*I.L.D.*

7.3–142 551.510.42:697.8

Priestley, C. H. B., **Plumes from tall chimneys.** *Weather*, 10(10):356–357, Oct. **1955. DWB**—Discusses arguments that a wide plume of high initial buoyancy will rise further than a narrow plume of high initial velocity. It is suggested that in model experiments the buoyancy must be scaled up by a large factor. *Subject Heading:* **1. Smoke plumes.**—*C.E.P.B.*

## UPPER ATMOSPHERE—IONOSPHERE

*See also:* **Ozone measurem. techniques** (Wulf, Zimmerman), 7.3–83; **Rocket sounding in upper air** (Appleton), 7.3–102; **Solar eruption** (Faust), 7.3–181; **Upper air temp. measurem.** (Paetzold, Zschörner), 7.3–184; **Tropospheric propagation** (Bean, Meaney), 7.3–297.

7.3–143 551.510.52/3:551.547(94)

*Morley, K. T., **Preliminary survey of Australian tropopause data.** *Australia. Bureau of Meteorology, Meteorological Study*, No. 6, April **1955.** 15 p. 59 figs., tables, 3 refs. **MH-BH**—An examination of frequency distribution of polar tropopause and tropical tropopause pressures for two years of data for Darwin and Hobart shows that frequency distributions based on two years of data for a station are representative. Frequency of occurrence of polar and tropical tropopauses both separately and simultaneously are given in tables "together with the percentage of days of occurrence for each station for each month." Frequency distribution of tropopause pressure and temperature for a four year period computed for every Australian radiosonde station are shown graphically. The extension of the Polar tropopause north of 25°S and the variation of tropopause pressures with latitude are considered. *Subject Headings:* **1. Tropopause types 2. Australia.**—*I.L.D.*

7.3–144 551.510.534:551.524.7

Adel, Arthur (*Univ. of Mich.*), **Effective radiation temperatures of the ozonosphere over New Mexico.** *U. S. Air Force. Geophysical Research Center, Geophysical Research Papers*, No. 2, Dec. **1949.** 31 p. 7 figs., 12 tables, 15 refs. **DWB**—Effective radiation temperatures of the ozonosphere were determined near Alamogordo, New Mexico, for 51 days and 5 nights between March 23, and July 15, 1948. A total of 138 independent sets of daytime data were obtained. Analysis of these data showed that there was no marked diurnal effect. The effective radiation temperature, in the neighborhood of −40°C, was essentially the same for both day and night. Observations showed no systematic connection between water vapor content of the atmosphere and effective radiation temperature of the ozonosphere. There was no marked effect of the amount of ozone (or of any other atmospheric constituent) in the radiation path on the obtained temperature values, except for very low altitude of the sun or moon, which resulted in a raising of the values. It was found that the ozonosphere radiation near zenith at 9.57 microns did not change in a pronounced way during the sunrise or sunset periods. *Subject Headings:* **1. Effective radiation temperature 2. Ozonosphere temperatures 3. New Mexico.**—*Author's abstract.*

7.3–145 551.510.534

Dobson, G. M. B., **Introductory remarks,** [to symposium on atmospheric ozone]. *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Mémoires et discussion*, p. 303–304. pub. **1953. DWB**—A general outline showing why ozone is of

special interest for meteorology and what observations are needed to increase our knowledge. *Subject Headings:* **1. Ozone layer 2. Ozone research.**—*A.A.*

7.3–146 535.34:551.510.534

Kay, R. H., **Some observations on the temperature-sensitive Huggins absorption bands of atmospheric ozone.** *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Mémoires et discussion,* p. 377–383. pub. **1953.** 2 tables, 3 eqs. **DWB**—Huggins absorption bands at 3220, 3239 and 3268Å were studied by photoelectric spectrophotometry. Five runs gave an effective temperature of the ozone layer of 240°K with an ozone amount of 0.2 cm. The results however are subject to great errors despite the best available techniques used. Direct balloon observations (up to 30 km) combined with a knowledge of the vertical ozone distribution give more reliable results. *Subject Headings:* **1. Ozone layer temperatures 2. Huggins bands 3. Ozone spectroscopy.**—*A.A.*

7.3–147 551.510.534:523.38

Paetzold, H. K., **Über die Möglichkeit der Benutzung von Mondfinsternissen zur Erfassung der vertikalen Ozonverteilung in verschiedenen Breiten.** [The use of moon eclipses for the measurement of the vertical ozone distribution at different latitudes.] *International Union of Geodesy and Geophysics. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Mémoires et discussion,* p. 333–336. pub. **1953.** fig., table, 2 eqs. **DWB**—An interesting method to determine the total amount and vertical distribution of ozone from the brightness distribution of the earth's shadow on the moon, especially in the green marginal zone. Some difficulties are involved since the sun is not a radiating point. Four evaluated series of measurements show a reasonable agreement with the results of other methods. The method is described in more detail in *Zeitschrift für Naturforschung,* 6a:639, **1951.** *Subject Headings:* **1. Ozone distribution 2. Lunar eclipses 3. Ozone measurement techniques.**—*A.A.*

7.3–148 551.510.534:551.593.5

Walton, G. F., **The vertical distribution of ozone.** *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Mémoires et discussion,* p. 316–322. pub. **1953.** 4 figs., 2 tables, eqs. **DWB**—The effect of secondary scattering of sunlight on the determination of the vertical distribution of ozone, reflected in the classical approach, is studied theoretically. The necessary correction is by no means constant over different zenith distances. Applying a refined method, the vertical distribution at Arosa is computed for one single case. *Subject Headings:* **1. Vertical ozone distribution 2. Scattering of light 3. Arosa, Switzerland.** —*A.A.*

## MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

*See also:* **Divergence analysis** (Landers), 7.3–128.

7.3–149 551.511

Chandrasekhar, S. and Elbert, Donna D., **The instability of a layer of fluid heated below and subject to Coriolis forces, Pt. 2.** *Royal Society of London, Proceedings, Ser. A,* 231(1185): 198–210, Aug. 22, **1955.** 2 figs., 6 tables, 10 refs., 64 eqs. Also: Fultz, D. and Nakagawa, Y., **Experiments on over-stable thermal convection in mercury.** *Ibid.,* 211–225. 7 figs., 2 tables, 11 refs., eqs. **DWB**—In the first paper the theory described in an earlier paper (CHANDRASEKHAR, 1953b) is extended in a manner which enables the determination of the critical Rayleigh number for the onset of thermal instability of a layer of fluid heated below and subject to rotation via a marginal state of purely oscillatory motions. Numerical results are derived for the case when the ratio of the kinematic viscosity to the thermometric conductivity has a value (=0.025) equal to that for mercury at ordinary temperatures. In the second paper experiments on the onset of thermal instability in rotating layers of mercury are described. In agreement with the recent theoretical work of Chandrasekhar the experiments show that the instability sets in as oscillations of increasing amplitude. Both the temperature gradients at which the instability sets in and periods of the oscillations in the marginal state are in

agreement with the theoretical predictions. *Subject Heading:* **1. Instability.**—*Authors' abstracts.*

7.3–150 551.511:551.513.1

Corn, J. and Fultz, D., **Synoptic analysis of convection in a rotating cylinder.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 34, Jan. **1955.** 74 p. 63 figs., table, 13 refs., eqs. **DWB, DLC**—The top surface motions of a liquid in a rotating cylinder which is heated at the rim are analyzed for their streamline and isotach patterns. A series of 35 consecutive analyses are presented and discussed. Measurements of the radial and tangential velocity components were made and the results of certain computations of the angular momentum transport, using these quantities, are presented. *Subject Headings:* **1. Convection 2. Atmospheric circulation models.**—*Authors' abstract.*

7.3–151 551.511:551.551

*Deacon, E. L., **Turbulent transfer of momentum in the lowest layers of the atmosphere.** *Australia. Commonwealth Scientific and Industrial Research Organization. Division of Meteorological Physics, Technical Paper*, No. 4, **1955.** 36 p. 12 figs., 6 tables, refs. p. 29–30. **DWB**—About 140 measurements of momentum flux, wind and temperature, and some simultaneous observations of eddy flux of heat and water vapor, and heat balance, were made at Edithvale, in a grassy pasture on extensive alluvial flats with only a few scrawny trees (20 mi south of Melbourne). A hot wire anemometer and a hot wire vertical yaw-meter, oriented into the wind by a light vane with vertical axis, photographic recording galvanometers, and machines for analyses of data, were used. Measurements were made at 1.5 and 29 m, sometimes using 2 instruments at the same height but different distances apart. Scatter diagrams show variations of shearing stress with stability, with height, and with record duration; and variation of heat flux with height under neutral conditions. A value for the von Karman constant of 0.38 is considered 10% too small because of bias in favor of low frequency turbulence. The vertical gradient of eddy energy and the various eddy spectra obtained (at various heights) by different authors are treated in the final chapter. Variations of shearing stress for 5 min. records of 22% were obtained at 1.5 m, increasing with height. *Subject Headings:* **1. Turbulent transfer of momentum 2. Richardson's number 3. Shear stress.** —*M.R.*

7.3–152 551.511:551.547

Hollmann, G., **Über- und untergradientische barokline Zonalströmung als Lösung der hydrodynamischen Gleichungen.** [Super- and infragradient baroclinic zonal currents as a solution of hydrodynamic equations.] *Meteorologische Rundschau*, Berlin, 8(7/8):105–107, July/Aug. **1955.** 7 refs., 36 eqs. **MH-BH**—With special assumptions about the dependence of functions on coordinates a solution is obtained of the equations of horizontal motion for a baroclinic field of flow. From this follows a supergeostrophic space-time flow in the upper troposphere which agrees qualitatively with that found empirically by H. Faust. The physical explanation is based on a predominance of anticyclonic centrifugal effect. *Subject Heading:* **1. Baroclinic fields.**—*Trans. of author's abstract.*

7.3–153 551.511:551.513.1

*Nyberg, A.; Duvedal, T. and Fryklund, S., **Transport of heat and momentum by horizontal large scale eddies in Nov. 1947, July 1949 and February 1950 north of 40°N.** *Sweden. Meteorologiska och Hydrologiska Institut. Meteorologiska Byran, Notiser och Preliminara Rapporter*, 1(4), **1954.** 38 p. 20 figs., tables, 4 refs., eqs. **DWB**—A synoptic-aerological study has been made of the meridional flux of sensible and latent heat and the flux of angular momentum for latitudes north of 40°N during Nov. 1947, July 1949 and Feb. 1950. From the flux, values have been computed for the temperature increase in 24 hrs in different levels and the frictional drag of the earth on the atmosphere. Values of the large scale eddy conductivity and diffusitivity have also been derived. *Subject Headings:* **1. Angular momentum flux 2. Meridional heat flux 3. Large scale eddies.**—*Authors' abstract.*

## GENERAL CIRCULATION

*See also:* **Airways weather** (Gales), 7.3–63; **Atmos. circulation models** (Corn, Fultz), 7.3–150; **Heat & momentum transport** (Nyberg et al.), 7.3-153; **Trade-wind circulation** (Flohn), 7.3–202; **Upper air circulation** (Pant), 7.3–212; **Drought in summer** (Gōda), 7.3–235; **Circulation patterns** (Friedman), 7.3–275.

7.3–154 551.513

Kats, A. L., **Kolichestvennaia kharakteristika gorizontal'nykh sostavliaiushchikh obshche tsirkuliatsii atmosfery v severnom polusharii.** [Quantitative evaluation of the horizontal characteristics of the general circulation of the atmosphere in the Northern Hemisphere.] *Meteorologiia i Gidrologiia*, No. 2:7–12, March/April **1955.** 3 figs., 2 tables, ref. **DLC**—The changes in the intensity of circulation at different altitudes were studied by calculating the indices of the zonal, meridional and general circulation in the region of 40–70°N lat. for standard levels of 0, 3, 6, 10, 13, 16 and 19 km on mean pressure charts. Graphs show the annual variation in indices of zonal, meridional and general circulation at 3 and 10 km, and corresponding temperature gradients at 60 km in the zone of 40–70°N lat. and changes with height and with latitude of the mean values of these indices, and tables present meridional and zonal specific flow in the zone of 40–70°N lat. for different standard levels, and specific zonal flow of air masses according to mean pressure charts in different latitude of the Northern Hemisphere. It is shown that the zonal circulation depends upon the temperature gradient equator-pole and its meridional zone upon the temperature gradient ocean-continent. The annual variations of the character of the relationship between the meridional and zonal circulation are analyzed. *Subject Headings:* **1. General circulation 2. Zonal circulation 3. Meridional circulation 4. Northern Hemisphere.**—*I.L.D.*

7.3–155 551.513.1:551.555.9

Dzerdzeevskiĭ, B. L., **Predvaritel'nye dannye o tsirkuliatsii atmosfery v dni s sukhoveiami v Prikaspii.** [Preliminary data on the atmospheric circulation in the Caspian Region during days with dry winds.] (In: Akademiia Nauk SSSR, Institut Geografii [and] Institut Lesa, **Mikroklimaticheskie i klimaticheskie issledovaniia v Prikaspiĭskoĭ Nizmennosti.** Moscow, **1953.** p. 18–29. 2 figs., 2 tables, refs. p. 28–29.) **DLC**—After concluding that success in the study of dry winds (sukhovei) can be achieved only by an investigation of both atmospheric circulation and heat balance, the author presents the results of his analysis of kinematic maps of the Northern Hemisphere and gives examples of circulation types producing drought. Fig. 2 shows 500 mb and 1000 mb pressure surfaces. Circulation anomalies producing dry winds develop in presence of certain large-scale atmospheric processes which cover all the Northern Hemisphere. Disturbances of zonal and development of meridional exchange are the dominant circulation processes in the lower layers of the troposphere on days of dry wind. The part played by arctic air masses is therefore of great importance. *Subject Headings:* **1. Atmospheric circulation 2. Sukhovei 3. Heat balance 4. Caspian Region, U.S.S.R.**—*A.M.P.*

7.3–156 551.513.1:551.515

Pfeffer, Richard L. and Saltzman, Barry, **Angular momentum as a parameter in the investigation of cyclone-scale circulations.** *Journal of Meteorology*, 12(5):500–507, Oct. **1955.** 7 figs., 3 tables, 12 refs., 17 eqs. **DWB**—Local angular momentum relative to a fixed vertical axis is used to measure the state of rotation of cyclones and anticyclones over the U. S. and North Atlantic. An approximation to STARR's equation for the time rate of change of this momentum is used in a study of upper air contours (mainly 500 mb), and the results are represented by harmonic spectra and autocorrelation. "It is found that the fluctuations of angular momentum can be accounted for primarily by the horizontal transport of momentum across the boundaries of the regions. Moreover, a sufficient lag relationship is found to exist so that the transport serves as a predictor of the 12-hour change of momentum." *Subject Headings:* **1. Angular momentum flux 2. Anticyclone circulation 2. Cyclone circulation.**—*C.E.P.B.*

7.3–157 551.513.2:551.515

Syonō, S.; Kasahara, A. and Sekiguti, Y. (*all, Tokyo Univ., Geophys. Inst.*), **Some statistical properties of the atmospheric disturbance on 500-mb level.** *Meteorological Society of Japan, Journal*, Ser. 2, 33(1):23–30, Feb. **1955.** 3 figs., 10 refs., 8 eqs. **DWB**—Disturbances of the 500 mb levels in 20–60°N, Jan. 11–20, 1949, are analyzed into component waves. The (amplitude)$^2$ spectrum $Z_n^2$ is found to fit the $-7/3$ power law for 5–16 component waves especially in 30–50°N. The standard deviation $\sigma_n/Z_n$ is about 0.5, independent of $n$; this is characteristic also of turbulent flow in a wind tunnel and shows that atmospheric disturbances fall in the field of turbulence. The daily values of $Z_0$ (mean height of circle of latitude) decreased in the north and increased in the south (correlation between 30° and 50°N $-0.72$) indicating north-south advection. Problems of Fourier expansion are discussed. *Subject Headings:* **1. Waves in the westerlies 2. Atmospheric circulation disturbances.**—*C.E.P.B.*

## ATMOSPHERIC DISTURBANCES

*See also:* **Tropical hurricane study** (Willett), 7.3–10; **Angular momentum flux** (Pfeffer, Saltzman), 7.3–156; **Atmos. circulation disturbances** (Syōno), 7.3–157; **High level turbulence** (Datta), 7.3–193; **Vertical currents in clouds** (Parczewski), 7.3–214; **Winter funnel clouds** (Beebe), 7.3–230; **Turbidity factor** (Neuwirth), 7.3–286.

7.3–158 551.515.1:551.462(261)

§Murray, R. and Marshall, C. P. W., **The storms and associated storm surges of December 21–23, 1954.** *Meteorological Magazine*, London, 84(1001):333–341, Nov. **1955.** 6 figs., 4 refs. **DWB**—The 500 mb contours for Dec. 20–24 showed a warm Atlantic ridge and a cold trough over Europe with strong N.W. flow over Britain. Two major storms are illustrated by surface and 1000–500 mb thickness charts and development parameters, and discussed. Widespread gales occurred with gusts up to 90 kn. The passage of two storm surges down the North Sea is illustrated by gage levels at 6 stations. They increased in magnitude southwards and warnings were issued, but as they did not coincide with a spring tide little flooding occurred. *Subject Headings:* **1. Storms 2. Storm surges 3. North Sea.**—*C.E.P.B.*

7.3–159 551.515.11:551.551

Oddie, B. C. V., **Model depressions on the Thames.** *Meteorological Magazine*, London, 84(1001):354–355, Nov. **1955. DWB**—Describes a "model" of a frontal depression formed at meeting of two streams of misty air flowing on either side of a ship. *Subject Headings:* **1. Structure of depressions 2. Air flow behind obstacles.**—*C.E.P.B.*

7.3–160 551.515.11

†Petterssen, Sverre, **Investigation of cyclone development.** Chicago Univ. Dept. of Meteorology, Contract AF 19(604)-390, Final Report, **1955.** 40 p. 23 eqs. p. 36: **Reports and papers of the Weather Forecasting Research Center.** p. 37–40, **Bibliog. of 66 items. DWB**—A summary of the results of an investigation of five major storms in the United States during the period Jan. 5–March 10, 1954, in order to discover early recognizable and predictable sequences of events preceding cyclogenesis at sea level, to study "the behavior of the level of non-divergence and to determine whether the concept of a compensation in the divergence field can be used in routine forecasting." The various methods of forecasting cyclogenesis are reviewed namely: types and analogues, correlation technique, pressure-tendency approach, and vorticity approach. The computation of vertical motion and divergence by the kinematic thermodynamic and vorticity methods is discussed in detail and the value of these methods is assessed. The theory of techniques for predicting development in the pressure field near sea level is outlined and its application is illustrated. The results of the experimental forecasting and their verification are summarized. *Subject Headings:* **1. Cyclogenesis 2. Cyclone development 3. Cyclogenesis forecasting.**—*I.L.D.*

7.3–161 551.515.13

Hoyle, H. D., **Unusual behaviour of a depression, April 17–23, 1954.** *Meteorological Magazine*, London, 84(1000):307–313, Oct. **1955.** 5 figs., 2 tables, 7 refs., 4 eqs. **DWB**—

Depression appeared on April 17 at southern tip of Greenland. Five stages are distinguished: formation, movement to ENE, SSE, SW, and slow movement. It filled up in 52°N, 26°W. Thickness 1000–500 and 500–300 mb and development charts show no thermal wind below 500 mb but in stage 3 divergence above 500 mb, deepening and steering to SE due to local advection of vorticity. In stage 4 steering was also due to thermal wind at 500–200 mb. A note by F. E. Dinsdale reports 4 similar but less developed sequences in 1949–1954. *Subject Headings:* **1. Cyclone movement 2. Greenland. I. Dinsdale, F. E.**—*C.E.P.B.*

7.3–162 551.515.3:551.501.8(421)

Bull, G. A. and Harper, W. G., **West London tornado, December 8, 1954.** *Meteorological Magazine*, London, 84(1000):320–322, Oct. **1955.** 2 photos. **DWB**—The tornado travelled for about 7 mi to NE at about 40 mph, doing much damage along a track 100–400 yds wide. It occurred with a deep depression (956 mb) over the Bristol Channel, and was accompanied by thunder, heavy rain and hail. Height-range and plan-position radar photos show in intense core of cumulonimbus which can be traced back to Hayling Is. where a waterspout occurred. *Subject Headings:* **1. Tornadoes 2. Radar tornado tracking 3. London, England.**—*C.E.P.B.*

7.3–163 551.515.31

Abdullah, Abdul Jabbar (*N. Y. Univ. Dept. of Met.*), **Some aspects of the dynamics of tornadoes.** *Monthly Weather Review*, Wash., D. C., 83(4):83–94, April **1955.** 3 figs., 2 tables, 17 refs., 38 eqs. **DWB**—In this paper an attempt is made to construct a dynamical model for a tornado that may explain some of its known features. The assumption is made that a tornado is dynamically equivalent to a combination of a pure sink and a pure vortex in the hydrodynamic sense. The compressibility of the air is taken into account, but the air is assumed to be dry. Friction is neglected and the motion induced by the disturbance is assumed to be horizontal. It is found that, because of the compressibility of the air, the flow is separated into three main regions, an outer region in which the flow is subsonic, an innermost region which cannot belong to the outer flow, and a middle region that separates the two, in which the flow is supersonic. Formulas are derived by which the radii of these regions may be computed. The minimum possible pressure and the maximum possible speed are computed. The vertical shape of the funnel is also computed on the assumption that it is parallel to the surface of the critical flow. *Subject Headings:* **1. Tornado dynamics 2. Tornado models 3. Vortexes.**—*Author's abstract.*

7.3–164 551.515.4(429)

Howe, G. Melvyn, **A South Wales thunderstorm.** *Meteorological Magazine*, London, 84(999):281–286, Sept. **1955.** 2 figs., 5 photos, 2 refs. **DWB**—A severe local thunderstorm occurred in mid-Glamorgan on Aug. 22, 1954. The storm track and rainfall are shown. The storm originated from convergence of unstable air. Damage by heavy rain and hail in the steep-sided Llynfi valley is shown by photographs. *Subject Headings:* **1. Thunderstorms 2. South Wales.**—*C.E.P.B.*

7.3–165 551.515.4(497.1)

*Malovčak, P., **Ponovno veliki broj grmljavina v Osijeku.** [Again considerable thunderstorm activity in Osijek.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 3(3/4):106–110, July/Dec. **1954.** 5 figs., 4 tables. **DWB**—Thunderstorm statistics for Osijek, Yugoslavia, are presented for the period 1901–1954. The tables and graphs include annual distribution of the frequency of thunderstorm days in June and distribution of thunderstorms in June by decade, pentad and day. There were 15 thunderstorms in June 1954 and 12 in June 1953. The record number of 17 was reached in 1910. Six thunderstorms in June was the number which occurred most frequently (12 times) during the 54-year period. Graphs showing annual variations of thunderstorm probability and of average temperature (Osijek, 1901–1940) are also presented. *Subject Headings:* **1. Thunderstorm frequencies 2. Thunderstorm statistics 3. Long period records 4. Osijek, Yugoslavia.**—*G.T.*

7.3–166 551.515.4:797.55

Piggott, D., **A flight in a thunderstorm.** *Weather*, 10(9):304–307, Sept. **1955.** fig., 3 photos. **DWB**—Description of a gliding flight in a cumulonimbus over Lasham, Eng., on July 14, 1955, reaching a height of over 23,000 ft. The altimeter curve is reproduced. Damage to the glider by hail and lightning is illustrated. *Subject Headings:* **1. Gliding flights 2. Thunderstorm flights.**—*C.E.P.B.*

7.3–167 551.515.8:551.509.31

§Anderson, R.; Boville, B. W. and McClellan, D. E., **An operational frontal contour-analysis model.** *Royal Meteorological Society, Quarterly Journal*, 81(350):588–599, Oct. **1955.** 4 figs., 8 refs. **DWB**—A 3-dimensional model developed at the Central Analysis Office, Montreal, is described. "A front is defined as a 3-dimensional baroclinic zone, having a first order discontinuity in the temperature and wind fields, and being reasonably continuous in space and time." Parameters for plotting are the shear hodograph, and wet bulb and saturated wet bulb potential temperatures. The polar, maritime and arctic fronts and associated air masses are described. Examples over N. America Jan. 11–12, 1954 show surface pressures, frontal contours, 500 and 300 mb isohypses, jet axis and tephigrams. *Subject Headings:* **1. Frontal analysis 2. Canada.**—*C.E.P.B.*

7.3–168 551.515.8:551.515(497.1)

§Đurič, Dušan, **Razvoj vremena pri prolazu hladnog fronta preko Vojvodine 3 i 4 aprila 1951.** [Weather development during a cold-front passage through Voivodina on April 3/4, 1951.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 3(3/4):99–103, July/Dec. **1954.** 8 figs. **DWB**—The purpose of this synoptic study is to illustrate the effect of a frontal discontinuity on the various meteorological elements. The graphical material presented includes: a surface pressure chart, isochrones of frontal passage and of thunderstorm beginning, two precipitation charts, pressure and temperature curves, and wind variations. *Subject Headings:* **1. Cold fronts 2. Atmospheric disturbances 3. Graphical presentation 4. Voivodina, Yugoslavia.**—*G.T.*

7.3–169 551.515.8:551.521.64

Jacklyn, R. M. (*Physics Dept., Univ. of Tasmania*), **Cosmic rays and air mass effects at Macquarie Island.** *Australian Journal of Physics*, Melbourne, 8(1):190–192, March **1955.** fig., table, 3 refs., eqs. **DLC**—In this note, the author gives results of an analysis of the various air mass types to show reason why the ratio of $\delta H/\delta B$ (rate of change of height of production level of mesons with surface pressure) varies as it does. Regression of $H$ on $B$ was calculated for 100, 200, 400, 600 and 800 mb from daily radiosonde flights at Macquarie Island. These are shown in table and on graph. It can be seen that $\delta H/\delta B$ increases steadily upward in polar air and decreases in temperate air. The relation correlates highly with the mean temperature of the air mass between 1000 mb and 100 mb, and the changes are characteristic of weather changes when cold fronts pass Macquarie Island in winter. Warming of temperate air before the cold front and warming of polar air (and increase in pressure) afterwards. *Subject Headings:* **1. Air mass effects on cosmic rays 2. Macquarie Island.**—*M.R.*

## RADIATION AND TEMPERATURE

### RADIATION

*See also:* **Night sky & solar radiation obs.** (Herrinck), 7.3-11; **Radiation calculations** (Lönnqvist), 7.3–86; **Sunshine distribution** (Thams), 7.3–87; **Solar radiation measurem.** (Shackleton, Quirk), 7.3–100; **Čerenkov radiation** (Jelley), 7.3–105; **Cosmic ray showers** (Subramaniam), 7.3–106; **Cosmic rays & air mass effects** (Jacklyn), 7.3–169; special bibliography on **Cosmic rays in the atmosphere,** p. 361.

7.3–170 551.521.1(73/9)

*Cunniff, Charles V. (*U. S. W. B., Blue Hill Obs., Mass.*), **Variations in the intensity of solar radiation at normal incidence on the surface of the earth.** *Monthly Weather Review,*

Wash., D. C., 83(5):101–103, May **1955.** fig., table, 9 refs. **DWB**—Tables and graphs show smoothed normal incidence solar radiation (% of normal) for each month from Jan. 1939 through Dec. 1952 for all stations in the U. S. and for Madison (since 1910), Lincoln (1915), Blue Hill (1932), Albuquerque (1941), Boston (1945) and Table Mountain, California (since 1947). Effects of volcanic eruptions (1951), smoke from cities, and from forest fires (Sept. 1950), dust storms (none), and then clouds that were not noted by the observer (except that a halo was reported) are discussed in relation to anomalies in the separate or integrated curves. The yearly mean was below normal for each year 1941–1950, including a very sharp dip which occurred from 1940 to 1942 [greatest anomaly since Katmai (1912)]. *Subject Headings:* **1. Solar radiation anomalies 2. Solar radiation data 3. Solar radiation intensity variations 4. United States.**—*M.R.*

7.3–171 551.521.1(73)

Fritz, Sigmund, **Solar radiation during cloudless days.** *Heating and Ventilating*, 46(1): 69–74, Jan. **1949.** 4 figs., table, 8 refs., 4 eqs. **DLC**—Twelve charts of the U. S. show average solar radiation received on a square centimeter of horizontal surface on the 15th of each month during cloudless days for each of the pyrheliometer stations in the country. Lines show anomalous effects of mountains and lakes. Effect of water vapor shown by curves and explained in test. Uses of data in agriculture, industry and meteorology are stressed. *Subject Headings:* **1. Solar radiation measurement 2. United States.**—*M.R.*

7.3–172 551.521.11

Mackiewicz, Maria, **Rozkład przestrzenny insolacji w Polsce.** [The spatial distribution of insolation in Poland.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 6(1/2):5–15, **1953.** fig., 2 tables, 14 refs., 4 eqs. English summary p. 14–15. **DWB**—A study of the properties of the atmosphere in Poland from the viewpoint of its transparency for solar radiation. It is based on data of direct solar radiation in Warsaw (1930–1938) and other points published by Stenz and Gorczyński. The relationship between intensity of radiation, the air mass and water vapor pressure was established and the yearly course of solar radiation studied. Mean transmission coefficient is greater in summer and greater in Poland than in Finland and Sweden. The space distribution of insolation calculated for 78 points in Poland shows that the influence of the geographical latitude prevails over variability of duration of sunshine; this is particularly true for the winter period. A map shows the distribution of insolation in the area, which is the largest in the southeast. *Subject Headings:* **1. Insolation 2. Direct solar radiation 3. Poland.**—*A.M.P.*

7.3–173 551.521.11

Riblet, Jean (*Obs. of Lyon and of Haute Provence*), **Problèmes d'insolation: compléments.** [Problems of insolation: supplement.] *Revue de Géographie de Lyon*, Lyons, 33(3):249–256, **1955.** 6 figs., 8 refs. **DWB**—(For abstract on article of same title based on data at Lyon, *see* 4.1–138, Nov. 1953, *MAB.*) "Perspectograph" showing reduction of length of sunshine by obstacles in the vicinity of Paris-St. Maur Observatory for the various 10-day periods throughout the year is applied to data for that station for 10 years (1933–39 and 1945–47) to show effect on monthly averages of maximum possible sunshine (clear days), on all days, clear or cloudy and on solar energy on a sq cm of surface normal to sun's rays. Annual histograms for 10-day mean duration of sunshine and energy on a sq cm are then presented and discussed. Microclimatic studies must take account of this appreciable factor. *Subject Headings:* **1. Sunshine duration corrections 2. Sunshine obstacle effects 3. Solar radiation microclimatology 4. Perspectographs 5. Paris, St. Maur, France.**—*M.R.*

7.3–174 551.521.3:551.524.371

Drimmel, J., **Der Frostschutz durch Lufttrübung—rechnerisch betrachtet.** [Frost protection by smoke screening, theoretically considered.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(4):443–451, **1955.** 3 figs., table, 10 refs. German, English

nd French summaries p. 443-444. **DWB**—A theoretical formula for the surface cooling rocess is deduced. The % decrease of cooling is calculated for interception of 20-100% outward radiation, beginning any time after sunset. To avoid advection of cold air a uniorm screen must be maintained over the whole basin, which requires cooperation of all interested parties. Time of beginning is very important; it should be before frost point is reached, which means about midnight in May, and it should be maintained until $1\frac{3}{4}$ hr after sunrise. A 50% effective screen can decrease temperature fall by 6°C. A frost-warning service is essential. *Subject Heading:* **1. Frost protection.**—*C.E.P.B.*

7.3–175 551.521.3:551.311.12

Miller, David H. and Howell, Wallace E., **Discussion of [Howell's] "Some measurements of ablation, melting, and solar absorption on a glacier in Peru."** *American Geophysical Union, Transactions*, 36(2):339–340, April **1955.** 2 tables. **DWB**—Miller suggests revision of Howell's estimate of heat budget on a Peruvian glacier, on Oct. 11 (*see* 6.2-171, Feb. 1955, *MAB*) to include: absorption of solar radiation 36 cal/cm², advection from rocks to snow 0 cal, long wave radiation loss −8 cal, evaporation loss −4 cal, and melting of snow 34 cal. He thinks the omission of the 3 smallest parameters would not make much difference in the Peruvian case, but would be serious in western U. S. where radiation is less but rate of snow melt double that in Peru. Howell suggests a further revision to 32, 14, 0, −12 and −34 cal, respectively for this glacier. (For abstract of original article, *see* 6.2-171, Feb. 1955, *MAB*.) *Subject Headings:* **1. Heat budget of glaciers 2. Glacial ablation 3. Nevado de Huagarancha Glacier, Peru.**—*M.R.*

7.3–176 551.521.4.535.33

Gush, H. P. and Jones, A. Vallance, **Infrared spectrum of the night sky from 1.0μ to 2.0μ.** *Journal of Atmospheric and Terrestrial Physics*, 7(4/5):285–291, Oct. **1955.** 6 figs., 1 refs. **DWB**—The night sky spectrum has been extended from 1.0 to 2.0μ at Saskatoon, using a PbS cell and a special spectrometer. A typical average spectrum is shown, and one with higher resolution of the maximum between 1.5 and 1.68μ. This was compared with synthetic spectra of the OH rotation-vibration bands at 260° and 200°K. Good qualitative agreement is found with that for 200°K. *Subject Heading:* **1. Night airglow infrared spectrum.** —*C.E.P.B.*

7.3–177 551.521.4

†Nicolet, Marcel, **Nitrogen oxides and the airglow.** *Journal of Atmospheric and Terrestrial Physics*, 7(6):297–309, Dec. **1955.** 5 figs., 33 refs., 20 eqs. **DWB**—The chemospheric processes lead to various possibilities for description of the contribution of nitrogen oxides in the airglow. An excitation of the Vegard-Kaplan system is indicated when nitric oxide is formed by a three-body collision process involving molecular nitrogen. A bimolecular association leading to nitrogen peroxide must show a continuous airglow during dark hours as well as in a sunlit atmosphere. Electronic systems emission of $NO_2$ is also possible because of a reaction between ozone and nitric oxide. A reaction leading to an excitation of the $O_2$ red atmospheric band system with its peculiar emissions is also discussed. Since these various processes causing day, twilight, and night airglow occur in the mesosphere and at the mesopause level, dynamic effects may lead to strong variations in the airglow. *Subject Heading:* **1. Airglow investigations.**—*Author's abstract.*

7.3–178 551.521.63:551.593

Sekihara, K. (*Met. Res. Inst., Tokyo*), **Observation of the distribution of ultraviolet sky radiation at comparatively low altitude of the sun.** *Meteorological Society of Japan, Journal*, Ser. 2, 32(11/12):317–324, Nov./Dec. **1954.** 5 figs., 2 tables, 6 refs. In Japanese; English summary p. 317. **DWB**—Observations of the angular distribution of ultraviolet sky radiation in the principal meridian plane were made at the summit of Mt. Fuji and at Tokyo by means of a photoelectric cell and filters mounted on a theodolite when it was almost sunset and also when the sun's altitude was 30°. Regarding the observed relative intensities at various

zenith distances, relatively high values at larger zenith angle were pointed out either when the wavelength of measured radiation was the shorter one or when the elevation of observing place was the higher one. These were both attributed to the effect of decreasing optical thickness of the scattering atmosphere which has already been discussed by the author. An investigation on the effect of the ozone layer was made by observing the intensity ratio of the two different ranges of U.V. sky radiation at the zenith. The well-known "Umkehr effect" was observed, thus showing a possibility of observing the ozone layer by means of this sort of apparatus. *Subject Headings:* **1. Ultraviolet radiation 2. Sky radiation 3. Atmospheric optics 4. Umkehr effect 5. Mt. Fuji, Japan 6. Tokyo, Japan.**—*Author's abstract.*

## TEMPERATURE

*See also:* **Radiation errors in radiosondes** (Rossi), 7.3–114; **Effective radiation temps.** (Adel), 7.3–144; **Frost protection** (Drimmel), 7.3–174; **Water temps.** (Frohnholzer), 7.3–187; **Dew point-min. temp. correlation** (Gentilli), 7.3–218; **Irrigation effects** (Reichelt), 7.3–261; **Sun & weather relation** (Takahashi, Asakura), 7.3–278; **High altitude winds & temps.** (Crary, Bushnell), 7.3–301.

7.3–179 551.524.3:417.512.2

*Reynolds, G., **Short periods of unseasonal warmth or cold in daily mean maximum temperatures at Bidston.** *Royal Meteorological Society, Quarterly Journal,* 81(350).613–617, Oct. **1955.** fig., 4 tables, 5 refs., eq. **DWB**—Daily means of maximum temperature 1900–53 and departures from 31-day means are tabulated and compared with annual variation synthesized from first 2 harmonics. This shows 3 cold and 1 warm spell of BUCHAN, and many of the singularities found by LAMB and BROOKS. *Subject Headings:* **1. Temperature singularities 2. Bidston, England.**—*C.E.P.B.*

7.3–180 551.524.4

*Sifontes, Ernesto, (*Ciudad Bolivar, Venezuela*), **Notas para el estudio del graduante termico en tierras tropicales.** [Notes for a study of the thermal gradient for tropical countries.] Caracas, Imprenta Nacional, **1954.** 20 p. photos at head of t-p: Meteorología tropical. **DWB**—Three short essays are presented: 1) The lapse rate in the atmosphere (Dec. 1953), 2) Notes on the lapse rate in the Eastern Llanos of Venezuela (July 1954), and 3) Meteorological conditions in Maracay (Aug. 1954). Radiosonde equipment is illustrated and extremes of temperature and lapse rate of 10–12 km over Maracay mentioned and an example of a sounding there on July 14, 1954 cited in tabular form. The temperature at 12 km over Venezuela is about the same as that at the ground in winter at the Pole. *Subject Headings:* **1. Vertical temperature gradient 2. Radiosonde data 3. Maracay, Venezuela.**—*M.R.*

7.3–181 551.524.7:551.510.53:523.75

Faust, H., **Die Wirkung von Sonneneruptionen auf die Erdatmosphäre.** [The action of solar eruptions on the earth's atmosphere.] *Naturwissenschaftliche Rundschau,* 8(10):402–403, Oct. **1955.** **DWB**—Summary of work by W. ATTMANNSPACHER on the connection between chromosphere eruptions and stratosphere temperatures. *Subject Headings:* **1. Solar eruptions 2. Stratospheric temperature variations. I. Attmannspacher, W.**—*C.E.P.B.*

7.3–182 551.524.7(234.3)

Holzapfel, Rupert and Manig, Marianne, **Zum Einfluss von Gebirgen auf die Temperatur der Troposphäre.** [On the influence of mountains on the temperature of the troposphere.] *Meteorologische Rundschau,* 8(5/6):88–89, May/June, **1955.** fig., 3 refs. **MH-BH**—The mean temperature in the free air at Munich (*see* 7.2–166, Feb. 1956, *MAB.*) is about 2°C higher than at Berlin. The difference is greatest in clear weather in winter, inappreciable in cloudy weather. This is mainly due to the effect of the Alps on the general circulation; it is being further investigated. *Subject Headings:* **1. Upper air temperatures 2. Mountain effects 3. Alps.**—*C.E.P.B.*

7.3–183 551.524.7

Malkevich, M. S., **O vertikal'nom raspredelenii temperatury v atmosfere.** [Vertical istribution of temperature in the atmosphere.] *Akademiia Nauk SSSR, Izvestiia, Ser. eofiz.*, No. 2:166–177, March/April, **1955.** fig., 4 tables, 10 refs., 46 eqs. **DLC**—The vertical istribution of atmospheric temperature is investigated theoretically by taking into account ertical mixing and radiational heat exchange. The vertical distribution of water vapor is etermined by observation. The selective absorption of radiation by water vapor is taken ito account. Integral equations for the vertical temperature gradient are derived and olved and the temperature of the upper boundary of the atmosphere is determined. *Subject leadings:* **1. Vertical temperature distribution 2. Vertical temperature gradient 3. Radiation eat exchange.**—*Trans. of author's abstract.*

7.3–184 551.524.7:535.34:551.510.534

Paetzold, H. K. and Zschörner, H., **Zur optischen Temperaturmessung des atmosphärischen Ozons.** [On the optical temperature measurement of atmospheric ozone.] *Meteorologische Rundschau*, 8(5/6):92–93, May/June **1955.** fig., 7 refs. **MH-BH**—The emperature effect on the Huggins band of ozone can be used to measure temperature at about 30 km. The method is discussed. On Zugspitze, Nov. 1953, it gave −35±2°C. *Subject Headings:* **1. Ozone spectroscopy 2. Upper air temperature measurement.**—*C.E.P.B.*

## SOIL TEMPERATURE

*See also:* **Soil thermometers** (Rider), 7.3–109.

7.3–185 551.525.2

Stoutjeskijk, P., **Temperatuurmetingen in heidebodem en stuifzand.** [Temperature measurements on moor soil and drift sand.] *Hemel en Dampkring*, The Hague, 53(5):94–96, May **1955.** 2 figs., 2 refs. **DLC**—Graphs show temperatures throughout 24 hrs (April 24 and 25, 1954) at surface, 2.5 and 10 cm deep in peat and sandy soil, and temperature depth profiles showing temperatures under variously oriented slopes and covers in afternoon. The amplitude of temperature is much greater and in general the temperatures were higher in sand than peat soil. The temperature variation at the surface is much greater than at 10 cm depth, for both orientation and cover variations. *Subject Headings:* **1. Soil temperature regime 2. Soil type influence on soil temperature 3. Kootwijk, Netherlands.**—*M.R.*

7.3–186 551.525.4:551.311.12

Fisher, Joel E., **Internal temperatures of a cold glacier and conclusions therefrom.** *Journal of Glaciology*, 2(18):583–591, Oct. **1955.** 3 figs., plate. English and German summaries p. 583. **DWB**—A horizontal tunnel near the summit of a steeply sloping glacier on Monte Rosa was driven to bedrock. Daily temperatures in July, Aug. and Sept. 1954 were taken in outside air, tunnel air, ice 10–90 m from tunnel entrance and bedrock. Probable distribution of temperatures in rock, ice and snow is shown in diagrams and discussed. Temperature varies from about 8°F near ice-air and ice-rock faces to 32°F in body of ice. Heat is carried against the thermal gradient by thawing and freezing in capillary passages. *Subject Headings:* **1. Temperature in glaciers 2. Monte Rosa, Italy.**—*C.E.P.B.*

## WATER TEMPERATURE

*See also:* **Warming of the Caribbean,** 7.3–255.

7.3–187 551.526.6:551.524.3

*Frohnholzer, Josef (*Munich*), **Wassertemperaturen 1953 und 1954 am mittleren Lech.** [Water temperatures of 1953 and 1954 in central Lech.] *Wasserwirtschaft*, Stuttgart, 45(9):231–232, June **1955.** 2 figs., table, 2 refs. **DWB**—Hydrological and temperature data from 7 observation stations on the Lech are analyzed and graphs presented to show the daily variations at all 7 places throughout the year during 1953 and 1954 and those between Rosshaupten and Augsburg, and between Pinswang (Tirol) and Augsburg. The temperatures are very

much influenced by sudden changes in air temperature, although there is some lag. Differences between air and water temperature for one week in Nov. 1954, and monthly mean, mean daily maximum and minimum values are shown for each month graphically for the 7 stations—as a cross section. *Subject Headings:* **1. Water temperatures 2. Water-air temperature difference 3. Lech Basin, Germany.**—*M.R.*

7.3–188 551.526.6:551.46(261.2)

Goedecke, Erich, **Über die Intensität der Temperatur-, Salzgehalts- und Dichteschichtung in der Deutschen Bucht.** [On the intensity of stratification in temperature, salinity and density in the German Bight.] *Deutsche Hydrographische Zeitschrift*, 8(1):15–28, **1955.** 9 figs., 7 tables, 16 refs. German, English and French summaries p. 15–16. **DWB**—The seasonal variations of temperature and salinity stratification in the waters between the German and Danish coasts and 55½°N, 6½°E are plotted from observations on lightships and at stations round Heligoland. The positions and depths of the discontinuities of density, temperature and salinity between North Sea and Baltic water, reconstructed from observations on the "Poseidon" in May 1933, are shown by maps and sections. *Subject Headings:* **1. Sea temperatures 2. Salinity 3. Sea water density 4. North Sea.**—*C.E.P.B.*

# PRESSURE AND WIND

## PRESSURE

*See also:* **Tropopause types** (Morley), 7.3–143; **Baroclinic fields** (Hollmann), 7.3–152; **Lunar air tide** (Sawada), 7.3–279.

7.3–189 551.541:631.43

Gilbert, T., **Das bewegliche Luftvolumen des Erdbodens.** [The volume of moving air in the soil.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, Vienna, 8(4) 397–410, **1955.** 5 figs., 2 tables, 10 refs., 20 eqs. German, English and French summaries p. 397. **DWB**—A set-up for measuring air movements at different depths in the soil is described. The complicated theory of pressure absorption in soil is set out. Experiments with artificial pressure waves showed a rapid decrease of amplitude down to 10 cm. Down to 20 cm the mobile air was 46% of the whole volume, decreasing to 38% at 60 cm (gravity effect). A slight increase in 60–70 cm was followed by a further decrease to 33% (blocking of pores). *Subject Heading:* **1. Soil respiration.**—*C.E.P.B.*

7.3–190 551.541:551.558.21

Palm, Enok, **Multiple layer mountain wave models with constant stability and shear.** California. Univ. at L. A. Dept. of Meteorology, Contract AF 19(604)-728, Scientific Report, No. 3, March **1955.** 27 p. 8 figs., 11 refs., 57 eqs. **DWB**—In this paper atmospheric waves behind a mountain are discussed. The introduction contains a nonmathematical description of the creation of lee waves. In Sec. 2, 3 and 4 models with velocity and stability distribution which approximate the observed data are discussed. It has been possible in two cases to compare the computed wave length with the observed in the Sierra Nevada region and in both cases a good agreement is found. The streamline and pressure field due to the resonance waves have been drawn for one of these. *Subject Headings:* **1. Lee waves 2. Laboratory models 3. Stability 4. Shear lines.**—*Author's abstract.*

7.3–191 551.54

*Tepper, Morris, **Pressure jump lines in midwestern United States, Jan.–Aug. 1951.** *U. S. Weather Bureau, Research Paper*, No. 37, June **1954.** 70 p. 52 figs. (incl. photos), 1 tables, 10 refs., eqs. Price: $0.45. **DWB, MH-BH**—Investigation based on a dense tornado and severe storm observational network concentrated in Kansas and Oklahoma. Accelerated microbarographs were mainly used for the analysis; in addition radar, upper air soundings and a press clipping service were utilized. A statistical summary shows monthly and geographical distribution of pressure jump lines, location and time of isochrones, orientation track, duration

ength and width of path and average speed as well as a correlation of these parameters and their relation to synoptic pattern. Severe local storms are definitely related to pressure jump lines and are usually located near the maximum "intensity-amplitude value of the pressure jump." Three case studies are presented and analyzed in relation to theoretical considerations, giving also the location of precipitation areas, synoptic maps at different heights, atmospheric line sections up to 400 mb and, finally, some photographs of radar scope presentation. A short analysis of radar data concludes the study. *Subject Headings:* **1. Pressure jump 2. Tornadoes 3. Microbarograph 4. Radar weather analysis 5. Kansas 6. Oklahoma.**—*A.A.*

## TURBULENCE

*See also:* **Flight plans** (Chadwick), 7.3–64; **Turbulence effects on airplanes,** 7.3–65; **Turbulence observation** (Bunker), 7.3–81; **Diffusion in free atmos.** (Edinger), 7.3–82; **Dispersion of particles in atmos.** (Edinger), 7.3–137; **Turbulence effects** (Poncelet), 7.3–141; **Turbulent transfer of momentum** (Deacon), 7.3–151; **Model depressions** (Oddie), 7.3–159.

7.3–192 551.551 551.554:551.555.1

Charnock, H.; Francis, J. R. D. and Sheppard, P. A., **Medium-scale turbulence in the trade winds.** *Royal Meteorological Society, Quarterly Journal,* 81(350):634–635, Oct. **1955. DWB**—Summary of paper describing observations by airplane at Anegada (18°15′N, 64°20′W) and discussion, mainly by JOANNE MALKUS. *Subject Headings:* **1. Turbulence in trade winds 2. Anegada, British West Indies.**—*C.E.P.B.*

7.3–193 551.551:551.515.8

†Datta, S. C. (*Met. Off., Santacruz, Bombay*), **High level moderate to severe turbulence near the I.T.F.** *Indian Journal of Meteorology and Geophysics,* Delhi, 5(4) 377–378, Oct. **1954.** 2 figs., table. **DLC**—Turbulence was encountered for about 15 min. at 15,500 ft over the Arabian Sea near Arabia between Cairo and Bombay (Lat. 22°40′N, Long. 61°40′E to 63°30′E) along Intertropical front but not in or near the clouds. Synoptic and upper air conditions are described and a chart for 12 GMT on 25 Aug., 1953, a cross section showing clouds and temperatures, and a table showing temperature and mixing ratio on Aug. 24 and 25 at 900, 850, 800 and 700 mb at Veraval are presented to show increase in mixing ratio and temperature between two stations. *Subject Headings:* **1. High level turbulence 2. Intertropical front 3. Arabian Sea.**—*M.R.*

7.3–194 551.551:551.554

Deacon, E. L., **Gust variation with height up to 150 m.** *Royal Meteorological Society, Quarterly Journal,* 81(350) 562–573, Oct. **1955.** 5 figs., 5 tables, 15 refs. **DWB**—Anemometers at 40, 210 and 503 ft on a radio mast in open grassland at Sale, Victoria, gave means $\bar{u}$ and gust maxima $u_2$ in strong winds. The increases with height relative to 40 ft are shown. They are larger for the more outstanding gusts, which set in earlier at greater heights than 40 ft. The value of $\alpha$ in $\bar{u}_{100}/\bar{u}_{10} = (z/10)^{\alpha}$ is 0.16 ($z$ in meters); at other stations it ranges from 0.17 to 0.26. Variation of gusts with height was fitted by $(z/10)^{0.085}$. Maximum vertical gusts at 210 and 503 ft are calculated as 33 and 34 mi/hr. *Subject Headings:* **1. Gust variation with height 2. Vertical wind velocity distribution 3. Sole, Victoria.**—*C.E.P.B.*

7.3–195 551.551:533.17

Ogura, Y. (*Tokyo Univ., Geoph. Inst.*), **A supplementary note on the relation between the space- and time-correlation functions in a turbulent flow.** *Meteorological Society of Japan, Journal,* 2nd Ser., 33(1) 31–37, Feb. **1955.** 8 refs., eqs. **DWB**—TAYLOR's assumption that the time correlation of turbulent velocity fluctuations is identical with the longitudinal space correlation is examined for 3-dimensional turbulence, and a relation between them is derived. The results are applied to diffusion from a fixed point source in turbulent flow. *Subject Heading:* **1. Turbulent flow.**—*C.E.P.B.*

7.3–196 551.551

**Op zoek naar wervelingen in de dampkring.** [On the search for atmospheric eddies.] *Hemel en Dampkring,* 53(4):78, April 1955. photo. **MH-BH**—Description (including a

photograph) of a technique used by the British Meteorological Office to determine atmospheric eddies or atmospheric turbulence. An airplane scatters self addressed post cards which are picked up and the locality in which they are found is noted by its finders. *Subject Headings:* **1. Atmospheric turbulence 2. Turbulence measurement.**—*I.L.D.*

7.3–197 551.551:551.554

Panofsky, H. A. and van der Hoven, I., **Spectra and cross-spectra of velocity components in the mesometeorological range.** *Royal Meteorological Society, Quarterly Journal,* 81(350): 603–606, Oct. **1955.** 2 figs., table, 8 refs. **DWB**—Records at 91 m on the Brookhaven tower are analyzed. Micrometeorological spectra (5 sec–3 min) under high and low radiation show the tendency of heat convection to produce energy at lower frequencies ($k$ cycles/km) than mechanical turbulence, and for a decrease of energy near $k=0.1$ (10 km or about 1 hr). Mesometeorological spectra (5 min–hourly) show a sharp increase for $k$ below 0.1. The minimum at 0.1 is attributed to a gap between convection or mechanical turbulence and motion on a cyclonic scale or diurnal variations. *Subject Heading:* **1. Turbulence spectrum.**—*C.E.P.B.*

## WIND

*See also:* **Gust effects on aircraft** (Durst), 7.3–66; **Airfield usability in gusty winds** (Wadsworth), 7.3–67; **Turbulence and shearing stresses** (Bunker), 7.3–81; **Turbulence in trade winds** (Charnock et al.), 7.3–192; **Gust variations with height** (Deacon), 7.3–194; **Turbulence spectrum** (Panofsky, van der Hoven), 7.3–197; **Monsoon floods** (Parthasarathy), 7.3–241.

7.3–198 551.553.12 551.552

*Stapley, Charles E., **Summary of mean streamline wind patterns for Dugway Proving Ground, 1952–1954.** *U. S. Dugway Proving Ground. Meteorology Div., Climatological Report,* No. 1, June 22, **1955.** 179 p. 12 tables, mostly diagrs. **DWB**—Patterns of wind speed and direction for the entire area of Dugway Basin are shown for each of the 12 months of the year and for 13 hrs (1800 to 0600 MST), based on records for 1952, 1953, and 1954. Tables for each month show quantitative data for each hour for 7 locations. Both vector winds and streamlines showing flow in relation to topography are indicated on each of the 156 separate charts. Discussion of the regime of each month brings out general katabatic flow in winter and in middle of night in other seasons and anabatic flow in evening and morning, April-Oct. *Subject Headings:* **1. Wind regime 2. Wind data 3. Streamlines 4. Mountain and valley winds 5. Dugway Proving Grounds, Utah.**—*M.R.*

7.3–199 551.553:551.584.31:551.588.2

Aulitzky, H., **Über die lokalen Windverhältnisse einer zentral-alpinen Hochgebirgs-Hangstation. 1. Mitt.** [Local wind conditions in a central Alpine high mountain slope station. Pt. 1.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B,* 6(4):353–373, **1955.** 8 figs., 2 tables, 8 refs. German, English and French summaries p. 353–354. **DWB**—Autographic observations were made in May–Nov. 1953 in the Oetz Valley, Tyrol, at 1940 m on a WNW slope in a clearing near the upper tree limit. The variations of wind direction and velocity are discussed in great detail. The mean winds varied from 1 m/s at night to 3 m/s by day. At night the prevailing winds were from S quadrant (60–70%) and E (16%) falling to 10% and 0% by midday. N quadrant winds increased from 5% at night to 36% between 10–11 h. W quadrant winds set in at 6 h and reached 43% at 12–14 h; these had the highest velocities. The associated variations of temperature and radiation are described. The increase of wind velocity followed the morning rise of temperature by 4½ h. The steering effect of the forest edge is important for the microclimate. *Subject Headings:* **1. Valley winds 2. Forest influences 3. Oetz Valley, Austria.**—*C.E.P.B.*

7.3–200 551.554:551.465

Charnock, H., **Wind stress on a water surface.** *Royal Meteorological Society, Quarterly Journal,* 81(350):639–640, Oct. **1955.** **DWB**—Summary of paper on vertical distribution of horizontal mean wind over a reservoir, giving a generalized wind profile $\frac{u}{u_x}=\frac{1}{k}\log\frac{gz}{u_x^2}+\text{const}$

The constant is approximately 12.5. Discussion of this and paper by W. H. MUNK (*see* 6.11–267, Nov. 1955, *MAB*) is included. *Subject Heading:* **1. Wind stress.**—*C.E.P.B.*

7.3–201 551.554

Ellison, T. H., **The Ekman spiral.** *Royal Meteorological Society, Quarterly Journal*, 81(350):637–638, Oct. **1955.** table, 3 eqs. **DWB**—A formula is given for the approach of the wind to a uniform constant geostrophic wind, with a table showing height at which the latter is attained and the angle between the surface wind and isobars. The effect of a thermal wind is considered. Comments by F. PASQUILL and P. A. SHEPPARD are included. *Subject Heading:* **1. Ekman spiral.**—*C.E.P.B.*

## SPECIAL WINDS

*See also:* **Turbulence in trade winds** (Charnock), 7.3–192; **Trade winds over islands** (Malkus), 7.3–215.

7.3–202 551.555.1:551.513

Flohn, H. (*Bad Kissingen*), **Studies on trade-wind circulation and equatorial westerlies.** *I.U.G.G. Association of Meteorology, Brussels, 1951, Procès-Verbaux des Séances, Mémoires et discussion*, p. 37–44. pub. **1953.** 4 figs., 13 refs. **DWB**—The equatorial westerlies, discovered by MEINARDUS as early as 1893, were rediscovered during World War II. FLOHN shows by aerological observations that this current is an important part of the general circulation. He even considers the Indian summer monsoon as a branch of the planetary tropical westerlies and incidentally shows the large extent of these westerlies and their seasonal shifting across the equator. *Subject Headings:* **1. Equatorial westerlies 2. General circulation. I. Meinardus, W.**—*A.A.*

7.3–203 551.555.8

§Bidasio, Defendente, **Il Ghibli.** [The ghibli, a hot dry wind.] *Geofisica e Meteorologia*, Genoa, 3(1/2):1–4, Jan./April **1955.** 2 figs., 5 refs. **DWB**—A systematic study of conditions favorable for the Ghibli—a hot dry dusty SE, S or SW wind from the Sahara blowing toward the Mediterranean Coast. It is named after Ghibla, a region to the south of the Tripolitania Coast. Temperatures of 45°C (113°F) were recorded at Tripoli, and 58°C (136.4°F) at Azizia, 40 km south at the foot of the Gebel, in May 1941. Typical conditions are illustrated by synoptic charts for May 15–20, 1941, and traces of meteorological elements for same period. The humidity fell to <10% from noon May 17 to 2 a.m. May 19. Vapor pressure fell to <4 mm and wind rose to only 20 km/hr. The ghibli is similar to the khamsin of Egypt or the chili of Tunisia, but differs from the sirocco of Italy in not having an over-water trajectory. *Subject Heading:* **1. Ghibli winds** —*M.R.*

7.3–204 551.555 8(426):551.311.3

Spence, M. T., **Wind erosion in the Fens** *Meteorological Magazine*, London, 84(1000): 304–307, Oct. **1955** 2 photos., ref. **DWB**—A "blow" in the Fens lifts the dry top soil of bare fields into the air and leaves a deposit of grains of 0.02 and 0.2 mm diameter in drifts behind obstacles. Blows occur about once in 5 years. That of May 4–5, 1955, when wind exceeded 45 kn in gusts, is described. At its worst the soil cloud reached a height of 150 ft and reduced visibility to 300 yds. *Subject Headings:* **1 Wind erosion 2 Sandstorms 3 East England** —*C.E.P.B.*

7.3–205 551.555 8

Temnikova, N. S., **Pyl'nye buri v Stalingradskoĭ oblasti.** [Dust storms in the Stalingrad Oblast.] *Meteorologiia i Gidrologiia*, Leningrad, No. 1:31–32, Jan./Feb. **1955.** table, ref. **DWB**—The author discusses the characteristics of dust storms occurring in the south east of European Russia on the basis of observations covering the period 1936–1950. A table gives data on the number of days with dust storms during the drought year of 1948 at various localities in the Stalingrad District. *Subject Headings:* **1 Dust storms 2 Stalingrad Oblast, U.S.S.R.**—*I.L.D.*

7.3–206 551.555.9(491)

Mertins, O., **Ein Beitrag zur Island-Wetterkunde. Windabschwächende Zone hart südlich Grindavik bei Ost- bis Nordostwinden.** [A contribution to the weather knowledge of Iceland. A zone of weak winds just south of Grindavik with E. to N.E. winds.] *Wetterlotse*, Hamburg, No. 93:201–204, Oct. **1955.** 2 figs. **DLC**—The sea about 63.7°N, 22.2°W (S.W. of Iceland) has a remarkable tendency for light winds in general E. and N.E. gales. This is illustrated by a chart for March 10–11, 1954. A high over N.E. Greenland extended a tongue over W. Iceland with a depression to the south. Wind was Beaufort 12 at Vestmanno but only 3–4 40 mi away. This is explained by the opening out of the isobars and formation of a small lee depression on the coast of S.W. Iceland (*see also* 7.2–184, Feb. 1956, *MAB.*).—*Subject Headings:* **1. Local winds 2. Iceland** —*C.E.P.B.*

## WIND EFFECTS

*See also:* **Typhoon pressure** (Heywood), 7.3–72; **Moisture exchange in crops** (Alpat'ev), 7.3–242.

7.3–207 551.556:551.465:532.593

Iampol'skiĭ, A. D., **O zavisimosti parametrov raspredeleniia elementov voln ot razgona, skorosti vetra i prodolzhitel'nosti ego deĭstviia.** [Dependence of parameters of distribution of the elements in waves on fetch, wind velocity and length of time of its action.] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofiz.*, No. 2 156–165, March/April, **1955.** 3 figs., table, 12 refs., 27 eqs. **DLC**—The statistical picture of sea waves is examined. Proceeding from the assumptions that (a) the function of distribution of the lengths of waves depends only upon one parameter and that (b) a functional relationship exists between the height and length of waves, the author derived an equation for determining the parameter of distribution in the function of wind velocity, the continuity of its action and the fetch. The result of the solution of the equation for a particular case agrees with the results of observations. The dependence of the length of waves upon the period velocity of spread and height is used to obtain the function of distribution of the elements. Methods of forecasting the parameter of distribution of waves for a distant wind field are indicated. *Subject Headings:* **1. Wind waves 2. Wind wave theory 3. Wave heights 4. Wave lengths.**—*Trans. of author's abstract.*

7.3–208 551.556:551.465(263)

Leipper, Dale F., **Nature of ocean currents in the Gulf of Mexico.** *Texas. Agricultural and Mechanical College. Dept. of Oceanography, Collected Reprints in Oceanography and Meteorology*, No. 1/30:31–34, **1950/54. DWB.** Reprint from *Texas Journal of Science*, 3(1): 41–44, March 30, **1955. DLC**—Oceanographic studies at Texas A & M are outlined, and a typical problem: determining currents at sea, is discussed in standard fashion. The three types of currents mentioned are (1) density, (2) wind driven and (3) tidal or internal wave currents. Density currents are said to be the major semipermanent currents of the oceans. Tidal currents are important along Texas coast, but wind currents, especially during hurricanes, are of major importance in the Gulf. These currents must be determined theoretically. *Subject Headings:* **1. Ocean currents 2. Wind driven currents 3. Gulf of Mexico.**—*M.R.*

7.3–209 551.556:532.593

Sibul, Osvald (*Univ. of Calif.*), **Laboratory study of the generation of wind waves in shallow water.** *U. S. Beach Erosion Board, Technical Memorandum*, No. 72, March **1955.** 35 p. 17 figs., 3 tables, 18 refs., 9 eqs. **DWB**—Wind waves in shallow water were studied in a laboratory channel. The experiments were conducted with smooth and rough bottom conditions, and with strips of cheese cloth in the channel to simulate the roughness effects of vegetation in nature. The data indicate that the SVERDRUP-MUNK-BRETSCHNEIDER curves may be used to predict the wave heights and periods for relatively deep water. In shallow water the wave heights may be considerably lower than predicted by the curves, depending upon the relative depth of water. The experiments indicate that the depth starts to affect the wave heights at approximately $d/H_0 < 5$. The wave periods are also affected by the depth, but not as much as are the wave heights. The reduction in period can be noticed when

$d/L_0 < 0.2$; the period continues to decrease with decreasing depth. Further, it was found that the maximum wave height for a group of 100 waves is 1.34 times that of the significant wave height and 1.93 times that of mean wave height, $H_{mean}$. The average period of the significant waves ($T_{H1/3}$) and the maximum waves ($T_{H\,max}$) was found to be of the same magnitude and equal to 1.10 times the mean wave period $T_{mean}$. The maximum wave period $T_{max}$ was found to be 1.25 times that of significant wave period $T_{1/3}$, and 1.42 times that of mean wave period, $T_{mean}$. *Subject Headings:* **1. Wind-wave relationships 2. Sverdrup-Munk-Bretschneider wave forecast method 3. Shallow water waves.**—*From author's abstract.*

7.3–210 551.556.2

van Eimern, J., **Über Schwankungen der Windschutzwirkung von Hecken und Baumreihen.** [On variations of the wind protection by hedges and tree groups.] *Meteorologische Rundschau,* Berlin, 8(7/8):122–127, July/Aug. **1955.** 3 figs., 2 tables, 6 refs. **DLC**—Wind measurements at 1.5 and 3 m height in Hamburg (Wulfsdorf) in July 1955 6–260 m behind a long N.-S. avenue of trees 12 m high with WNW winds are tabulated by wind speed and time of day, as % of that at 260 m. The % reduction of wind speed by day was greater than by night near the avenue but less 100 m away. It decreased with increasing wind speed. The scatter near the avenue was very large, especially with light winds, decreasing with increasing distance. Some observations 40 and 160 m behind a 5 m hedge are also discussed. *Subject Headings:* **1. Shelter belt effects 2. Hamburg, Germany.**—*C.E.P.B.*

7.3–211 551.556.4:551.510.42

Pasquill, F., **Preliminary studies of the distribution of particles at medium range from a ground-level point source.** *Royal Meteorological Society, Quarterly Journal,* 81(350):636, Oct. **1955. DWB**—Summary of observations by airplane at Farnborough and comment by M. J. Lighthill. *Subject Heading:* **1. Particle trajectories.**—*C.E.P.B.*

## UPPER AIR WINDS

*See also:* **Airways weather** (Gales), 7.3–63; **Wind data accuracy** (Anderson), 7.3–88; **Upper air wind conditions** (Graf), 7.3–90; **Upper air obs.** (French West Africa. Serv. Météorologique), 7.3–97; **High altitude winds & temps.** (Crary, Bushnell), 7.3–301.

7.3–212 551.557:551.513

*†Pant, P. S., **Circulation in the upper atmosphere.** N. Y. Univ. College of Engineering. Research Div., Contract AF 19(604)-1006, Scientific Report, No. 1, May **1955.** 43 p. 8 figs., 9 tables, 56 refs., eqs. **DWB**—The winds in the region from 20 to 100 km over the Northern Hemisphere are critically examined. The temperatures are computed from the wind field with the aid of rocket mean pressure data and under the assumption that the wind field is geostrophic. The computed temperatures are found to agree with direct observations. Tentative temperature cross sections for the region from 20 to 90 km over the Northern Hemisphere for summer and winter are presented. On the basis of the winds in the region from 20 to 100 km, and of theoretical considerations, the circulation in the mesosphere and thermosphere is derived. Though certain parts of the circulation proposed here, especially above 100 km and at very high and very low latitudes, remain to be confirmed by direct observations of winds, the present model of circulation in the upper atmosphere appears to be satisfactory. Hydrodynamic instability is considered more likely in the thermosphere than at lower levels. *Subject Headings:* **1. Upper air circulation 2. Upper air winds 3. Northern Hemisphere.**—*From author's abstract.*

## VERTICAL MOTION

*See also:* **Multiple layer mountain wave models** (Palm), 7.3–190.

7.3–213 551.558:551.576.11

Vonnegut, Bernard; Malkus, Joanne Starr; Byers, H. R. and Braham, R. R., Jr., **Downdraft in cumulus clouds.** *Journal of Meteorology,* 12(5):508–510, Oct. **1955.** 8 refs. **DWB**—

Vonnegut asks why Malkus (*see item* 5.6–210, June 1954, *MAB*) and Byers and Braham (*J. Meteor.*, 5:71–86, 1948) give such different pictures of circulation associated with cumuli. Malkus suggests that updraft can only predominate until the first tower reaches its maximum height. All clouds she examined had updraft-scale downdrafts, usually at the downshear edge. Byers and Braham agree that the difference was due to the different class of cloud; they were dealing with developing giant cumuli. *Subject Headings:* **1. Cumulus clouds 2. Downdrafts in cumulus clouds.**—*C.E.P.B.*

7.3–214 551.558 551.576.1:551.515.4

Parczewski, Władysław, **Studia nad prądami pionowymi w obszarach występowania chmur cumulus i cumulonimbus.** [Study of vertical currents in regions of occurrence of cumulus and cumulonimbus clouds.] *Przegląd Meteorologiczny i Hydrologiczny*, Warsaw, 8(1):17–39, **1955.** 7 figs., 6 tables (5 fold.), refs. Russian summary p. 39. **DWB**—The results of the study are based mainly on observations made during glider contests organized in Poland in the years 1951–1954. First the author explains the method of selecting observation data from the glider and determining the degree of their accuracy. Further he discusses the velocities and types of thermal vertical currents for various kinds of baric situations. Next, structures of thermal vertical streams are analyzed in detail and the relationships which exist between velocities of currents and the base height of Cu and CuNb clouds are discussed. Author's theory of the development of thermal thunderstorms and of the internal structure of these clouds (cumulus and cumulonimbus) are also presented. The conclusions are: from the view point of the pattern, speed and expansion (vertical and horizontal) of vertical flows, Cu and CuNb clouds can be divided into several groups. Each of them corresponds to a baric situation and a determined air mass peculiar to this group. Correct determination of these elements enables one to forecast the pattern, velocity and vertical extension of thermal vertical currents. Continuous visual observations of the development of cumulus and cumulonimbus clouds and simultaneous observations of their vertical structure made by glider pilots inside and outside of the clouds is one of the best methods of studying their structure and the processes occurring within them. *Subject Headings:* **1. Vertical currents 2. Cumulus clouds 3. Cumulonimbus clouds 4. Cloud structure 5. Thunderstorms.**—*A.M.P.*

7.3–215 551.558.1:551.555.1

Malkus, Joanne S., **The effects of a large island upon the tradewind air stream.** *Royal Meteorological Society, Quarterly Journal*, 81(350):538–550, Oct. **1955.** 11 figs., 11 refs., eqs. **DWB**—Four vertical aircraft soundings to 2600 m on a 200 km line across Puerto Rico near noon on June 25, 1952 measured temperature, pressure, humidity and wind. Sections show a) potential temperature and mixing ratio, b) sub-cloud layers, stability, cloud configuration and 1000 ft winds. "The existence of a fairly symmetrical orographic-convection cell with ascent over the island and compensating subsidence in a surrounding ring is established" and its field of motion is deduced from the observed winds and the calculated mean convective motion. This is confirmed by construction of a moisture budget. The effects of the convection cell on the properties of the tropical air mass, initiation of cumulus clouds and level of trade-wind inversion are discussed. *Subject Headings:* **1. Trade wind over islands 2. Puerto Rico.**—*C.E.P.B.*

7.3–216 551.558.21

Pilsbury, R. K., **Preliminary analysis of standing-wave reports received at Northolt during the winter of 1953–54.** *Meteorological Magazine*, London, 84(1000):313–318, Oct. **1955.** 5 refs. **DWB**—In winter 1953–54, 66 lee waves over British Isles reported by pilots were analyzed. Conditions in common were (1) a steep lapse from surface to 2000 (sometimes 7000) ft, (2) a layer of marked stability above this. In 62 cases there was a layer of steeper lapse above (2). Wind at 950 mb generally exceeded 20 kn. Wind direction was constant in (1) and (2) but speed increased to top of (2). Height, location and frequency of occurrence are examined. Wave lengths varied from 2–8 mi, vertical currents from 100–2200 ft/min

the strongest being generally in rear of slow-moving surface cold fronts. Turbulence was rare. *Subject Headings:* **1. Lee waves 2. British Isles.**—*C.E.P.B.*

# AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

## HUMIDITY

*See also:* **Irrigation effects** (Reichelt), 7.3–261.

7.3–217 551.57:551.585(67)

*Sansom, H. W., **Climate of East Africa, based on Thornthwaite's classification.** *East Africa High Commission. Meteorological Dept., Memoirs*, 3(2), **1954.** 49 p. 6 tables, 2 charts (fold.), 27 figs., 10 refs. **DWB**—An analytical study of moisture balance in East Africa, Kenya, Uganda, Tanganyika and Zanzibar based on 24 selected stations for evapotranspiration, and over 100 stations for other elements of the water balance. Thornthwaite's formula and classification are discussed critically and are used in calculations and charts. Individual graphs of mean monthly rainfall and potential evapotranspiration are given for 23 stations, colored isopleth charts show climatic regions of East Africa according to THORNTHWAITE's formula, and seasonal variation of effective moisture in East Africa. A scatter diagram shows relation of thermal efficiency to altitude (sea level to 9000 ft) in East Africa, using records for >100 stations. *Subject Headings:* **1. Potential evapotranspiration 2. Thermal efficiency 3. Thornthwaite's classification 4. East Africa.**—*M.R.*

7.3–218 551.571:551.524.36

Gentilli, J. (*Western Australia Univ., Nedlands, W. A.*), **Estimating dew point from minimum temperature.** *American Meteorological Society, Bulletin*, 36(3):128–131, March **1955.** 4 figs., eqs. **MH-BH**—Dew point and minimum temperatures are correlated in scatter diagrams for (a) various regions of the U. S., (b) for various seasons at a high elevation station, (c) monthly mean values for Yuma, Arizona and (d) United States vs. Perth, Western Australia. Mean monthly values for U. S. and Perth do not differ very much, but values for mountain and plateau stations depart markedly from the normal curve. *Subject Headings:* **1. Dew point-minimum temperature correlation 2. Frost forecasting 3. United States 4. Perth, Western Australia.**—*M.R.*

7.3–219 551.571:536.24:646.1

Woodcock, Alan H. and Dee, Thomas E., Jr. (*QM Climatic Res. Lab., Lawrence, Mass.*), **Wet-cold I. Effect of moisture on transfer of heat through insulating materials.** *U. S. Quartermaster Corps. Research and Development Branch. Environmental Protection Section, Report*, No. 170, Dec. **1950.** 20 p. 7 figs., 12 refs., 10 eqs. **DWB**—On the basis of the principle of moisture diffusion and heat transfer, the authors present a theoretical analysis of heat transfer through moist and dry insulation. The results of wicking experiments with various types of single and double layer materials and their application to clothing are discussed. *Subject Headings:* **1. Moisture diffusion in clothing 2. Clothing efficiency.**—*I.L.D.*

7.3–220 551.571.7

*Murgatroyd, R. J.; Goldsmith, P. and Hollings, W. E. H., **Some recent measurements of humidity from aircraft up to heights of about 50,000 ft over southern England.** *Royal Meteorological Society, Quarterly Journal*, 81(350):533 537, Oct. **1955.** 2 figs., table, 4 refs. **DWB**—Temperature observations and frost point observations with a pressurized Dobson-Brewer hygrometer from 5000–50,000 ft over S. England on 35 days in 1954 are tabulated and mean values plotted. The frost point decreased to a constant value of −115 to −120°F 10 15,000 ft above tropopause (mean temperature about −60°F). High tropopauses had lower temperature and frost point than low tropopauses, but this effect disappeared at higher levels. *Subject Headings:* **1. Upper air humidity 2. England.**—*C.E.P.B.*

## EVAPORATION

*See also:* **Evap. from reservoir surface** (Braslavskiĭ, Vikulina), 7.3–15; **Irrigation effects** (Reichelt), 7.3–261.

7.3–221 551.573:551.481(794)

Blaney, Harry F., **Evaporation from and stabilization of Salton Sea water surface.** *American Geophysical Union, Transactions*, 36(4):633–640, Aug. **1955.** 2 figs., 7 tables, num. refs. **DWB**—Salton Sea was formed as the result of a break of the Colorado River in 1905 when practically the entire flow of the river discharged into the Salton Basin for nearly two years. At that time this body of water covered about 350,000 acres and reached a maximum elevation of 195 ft. below sea level. For many years the excess of evaporation over inflow caused the elevation of the water surface to drop some 55 ft to minus 250 ft by 1923. Since 1935, the water level in Salton Sea has been rising. In recent years this has resulted in encroachment and damage on adjoining lands, causing concern to Federal, State, and local agencies and land owners. Therefore, three evaporation stations bordering the sea were established to study the problem. An analysis of pan evaporation, gage heights, and inflow measurements indicates that the annual evaporation from Salton Sea ranges from about 70 to 76 in. The Federal Government has withdrawn from entry all public land in the area below the elevation minus 220 ft Salton Sea, in Jan., 1954, had arisen to an elevation of minus 235.8 ft and thus has leeway of 15.8 ft before reaching the minus 220-ft contour. A review of this study and other reports indicates that the water surface will continue to rise for a number of years but will eventually stabilize below an elevation of minus 220 ft prior to the year 1980. *Subject Headings:* **1. Evaporation from salt lakes 2. Lake-levels 3. Salton Sea, California.**—*Author's abstract.*

7.3–222 551.573

Demiańczuk, Piotr Pawel, **Zdolność potencjalna parowania w przedziale wplywu slonca.** [The potential capacity of evaporation under the influence of the sun.] *Poland. Państwowy Instytut Hydrologiczno-Meteorologiczny, Wiadomości, Służby Hydrologicznej i Meteorologicznej*, 3(4):303–315, **1954.** 2 figs., 9 tables, 10+ eqs. Russian and French summaries p. 314–315. **DLC**—A highly theoretical paper in which the questions of evaporation from the ground and from open water surface are treated and solved on a physical basis, many different from the methods used before. The physical principles of the formulas for the determination of potential capacities of evaporation (in the different months of the year) under influence of the sun rays, without consideration of the transpiration of plants, are based on premises introduced in an earlier report of the author (1952) at a scientific conference in Warsaw called by the Meteorological and Hydrological Society. It is pointed out that an accurate numerical presentation of the problem could be made only from observational data of the German network, because the Polish meteorological network does not have the required data. *Subject Heedings:* **1. Potential evaporation 2. Solar influences.**—*A.M.P.*

7.3–223 551.573:631.6

Penman, H. L., **Water control for increased crop production.** *Advancement of Science*, London, 12(45):29–32, June **1955.** 7 refs. **DLC**—Summary of 4 papers at the British Association. Potential transpiration can be calculated from energy balance or by aerodynamic method. In Great Britain the dominant factor is solar radiation. The difference from rainfall indicates the need for irrigation; the tolerable deficit must be found by experiment. Technique depends on soil and stage of plants. Some results are described in which irrigation gave good increases in yields. In Burwell Fen the water table, controlled by drainage, is correlated with crop yields. *Subject Heading:* **1. Irrigation effects.**—*C.E.P.B.*

7.3–224 551.573(581)

*Stenz, Edward **On evaporation capacity in Kabul.** *Afghanistan. Meteorological Service Publication*, No. 2, **1941.** 10+11 p. 2 tables, 7 refs., eqs. In English and Persian. **DWB**—Evaporation capacity in Kabul is calculated as 8 times as great in summer as in winter, and for the year as a whole is 7 times the precipitation (2300 mm/300 mm). These figures are

Based on data (evaporation and precipitation) obtained in 1940 at the Central Meteorological Observatory at Share-Nau [New City] (3 times a day from a pan 70 cm above ground in a protected garden). Results are given in a table and methods of calculating elaborated. Values obtained in 1924–25 by H. E. Iven (3031 mm) at the Nedjat School in Kabul. Evaporation here is about the same as in southern Idaho or N. Arizona or in the dry savannahs of New South Wales and somewhat less than in E. Sudan (4020 mm). *Subject Headings:* **1. Evaporation data 2. Water deficit 3. Kabul, Afghanistan.**—*M.R.*

## CONDENSATION

7.3–225 551.574.1

Rau, Walter, **Grösse und Häufigkeit der Chloridteilchen im kontinentalen Aerosol und ihre Beziehungen zum Gefrierkerngehalt.** [Size and frequency of chloride particles in continental aerosol and their relation to the freezing nuclei content.] *Meteorologische Rundschau*, 3(9/10):169–175, Sept./Oct. **1955.** 11 figs., 2 tables, 19 refs. **DWB**—Counts of chloride particles were made at Weissenau on 225 days (810 counts) with an electrical separator. The number was very variable but 52% of observations gave $<0.05/cm^3$ and only 6% $>1/cm^3$; 90% were of radius 0.16 to $0.4\times10^{-4}$ cm and none over $2\times10^{-4}$. Wind roses show greatest frequency with W–SW and least with E winds. They were most common with maritime temperate and altered polar air. None were observed with fog, high fog, haze or light drizzle, most with clear skies clouding over. Results are compared with those of observers in maritime situations. *Subject Headings:* **1. Saline nuclei 2. Weissenau, Germany.**—*C.E.P.B.*

7.3–226 551.574.42:001

Seligman, G., **Hoar frost or frozen dew?** *Weather*, 10(11):395, Nov. **1955. DWB**—Definitions and descriptions of hoar frost and rime. *Subject Headings:* **1. Hoar frost 2. Rime 3. Definitions.**—*C.E.P.B.*

## FOG

*See also:* **Combustion & smog** (Faith), 7.3–138.

7.3–227 551.575.1

*Nurminen, A., **Einige Ergebnisse der Seenebelforschung.** [Some results of sea fog investigations.] *Berlin. Freie Universität. Institut für Meteorologie und Geophysik, Meteorologische Abhandlungen*, 2(3):126–151, **1954.** 25 figs., 5 tables, 8 refs. **DWB**—Using the data on the occurrence of sea fogs along the southern and western coasts of Finland during the period 1947–1953, the author attempts to explain the meteorological conditions associated with the appearance of sea fogs. It is found that the temperature difference between air and water need not be very large. A moderate wind, a dew point 2 to 3°C higher than the sea water temperature for a period of several to 24 hours and somewhat unstable air are prerequisites for sea fog formation along the Finnish coasts. Specific examples of the formation of sea fog in anticyclone or cyclonic pressure fields are presented with the aid of synoptic analyses. *Subject Headings:* **1. Sea fog formation 2. Sea fog frequencies 3. Finland.**—*I.L.D.*

7.3–228 551.575.1

*†Stanford Research Institute, Stanford, Calif., **Investigation of the ice fog phenomena in the Alaskan area.** Contract AF 19(122)-634), Final Report (Report No. 21), Dec. 28, 1951–Sept. 30, **1954.** 157 p. 52 figs., (incl. photos), 9 tables, 29 refs. p. 141–152, Abstracts of reports issued on this project. **DWB**—This report contains the results of a combined laboratory and field investigation of ice fog carried out from 1951–1954. The investigation covered the meteorological conditions associated with ice fog formation, the sources of ice fog such as atmospheric contaminants, man-made vapor pressure, etc., physical characteristics of ice fog, processes leading to ice fog formation and ice fog prevention and other remedial measures. Data are shown in graphs and tables; photographs of the apparatus employed and of ice fog conditions are presented. *Subject Headings:* **1. Ice fog 2. Fog studies. I. Bell, Gordon B. II. Thuman, William C. III. St. John, Gilbert A. IV. Wiggins, Ernest J.**—*I.L.D.*

7.3–229 551.575.1

Wagner, Richárd, **Fluktuálo töbörköd.** [Fluctuating fog in a depression of the soil.] *Időjárás*, Budapest, 58(5):289–298, Sept./Oct. **1954.** 7 figs., 4 tables, ref., 10 photos. **DWB**—Fluctuation of ground fog was observed in a series of depressions at the foot of Hosszúbérc (Bükk Mountains) in 1953 and 1954. Fog starts to form at the bottom of a depression, then seemingly flows out of the depression and again recedes into it. This process is repeated two or three times until finally the fog fills the entire area up to the tree tops. This peculiar weather phenomenon is caused by alternating periods of fog formation and dissipation rather than by air currents. *Subject Headings:* **1. Fog mechanics 2. Fog formation 3. Fog dissipation 4. Bükk Mountains, Hungary.**—*G.T.*

## CLOUDS

*See also:* **Downdraft in cumulus clouds** (Vonnegut et al.), 7.3–213; **Vertical currents in clouds** (Parczewski), 7.3–214.

7.3–230 551.576.1:551.515.3

§Beebe, Robert G. (*U. S. W. B., Kansas City*) and Stork, J. E. (*U. S. W. B., Burlington, Vt.*), **Winter funnel clouds over Lake Champlain.** *Weatherwise*, 8(2):44–46, April **1955.** 3 figs. **DWB**—A unique occurrence of a series of at least 40 funnel clouds (some reaching the surface of Lake Champlain to create waterspouts) which formed on Feb. 12, 1954 in an extremely cold air mass (surface air temperature at airport 8 mi away −8°F; 850 mb temp. −25°C) which passed over open water at 28° to 33°F, giving a lapse rate of 3.42°C/100 m up to cloud base or 2°C/100 m (double the dry adiabatic lapse rate) to cloud tops. The clouds formed in the northerly flow at the north end of the long lake and disappeared at the south end. As the phenomenon was purely local, no severe storm warnings were issued, though the occurrence was reported on teletype circuits. Photograph, adiabatic chart (Burlington, Vt.) and surface synoptic chart for day are included by way of illustration. *Subject Headings:* **1. Waterspouts 2. Lake effects 3. Funnel clouds 4. Lake Champlain, Vt.**—*M.R.*

## PRECIPITATION

7.3–231 551.577(672, 691)

*Suraud, P., **Étude des précipitations de l'Afrique Noire Française par bassin.** [Study of precipitation of French Equatorial Africa by basins.] *Annuaire Hydrologique de la France d'Outre-Mer*, 1952. Paris, pub. **1954.** p. 37–57. tables. Also Minjoz, R., **Étude des précipitations à Madagascar par bassin.** [Study of precipitation at Madagascar by basins.] *Ibid.*, p. 58–71. tables. Also Roche, M., **Étude des débits.** [Study of runoff.] *Ibid.*, p. 72–86. **DWB**—Data for each month of 1952 and for the year are tabulated for 47 stations in separate portions of the various basins of the Niger and its tributaries along with data for the period of record (3 to 18 yrs), and discussed basin by basin. *Subject Headings:* **1. Precipitation data 2. French Equatorial Africa 3. Madagascar.**—*M.R.*

7.3–232 551.577.37:551.583.3

†Hombek, Maria, **Plejstoceński okres pluwialny.** [Pluvial period in the Pleistocene.] *Czasopismo Geograficzne*, Warsaw, 25(4):334–345, **1954.** fig., 2 tables, 25 refs. French summary, p. 345. **DWB, DLC**—An attempt is made to correlate the Pleistocene glacial and pluvial formations and the post-glacial stages in Europe, Africa, Palestine and N. America, and to reconstruct the climates of the pluvial period from mountain glaciers, lake levels and river terraces. The non-glacial formations are divided into cold rainy pluvial periods (fall of temperature 4°C) and warmer dry interpluvials, which synchronised with glacial and interglacial periods, respectively, in higher latitudes. *Subject Headings:* **1. Pluvial periods 2. Quaternary climates.**—*C.E.P.B.*

7.3–233 551.577.37(52)

§Imai, H. and Nakamura, Haruo, **On the heavy rainfall in Kyoto Prefecture (first note).** *Journal of Meteorological Research*, Tokyo, 6(9):461–464, **1954.** 5 figs., table, 2 refs. In Japanese. **DWB**—Items such as the frequency of heavy rainfall, heavy rainfall during

"Bai-u" season, and heavy rainfall caused by typhoons are synoptically discussed for Kyoto Prefecture. *Subject Headings:* **1. Excessive rainfall 2. Excessive rainfall frequencies 3. Bai-u 4. Typhoon effects on rainfall 5. Kyoto Prefecture, Japan.**—*H. Arakawa.*

7.3–234 551.577.38:551.509.33(523.2)

Gōda, Isao, **On the drought in summer, Pt. 1, In Kagawa Prefecture.** *Journal of Meteorological Research,* Tokyo, 6(8):360–368, Nov. **1954.** 3 figs., 6 tables. In Japanese; English summary p. 360. **DWB**—Droughts in summer were often experienced all over the western parts of Japan, but in Kagawa Prefecture agricultural damage by drought was not so much, and a cause of this seems to be the existence of a large number of irrigation reservoirs. In this report, control effects by irrigation reservoirs are statistically examined, using the agricultural and meteorological data during the period 1893–1950. The principal results are as follows: (1) A classification of droughty summers in Kagawa Prefecture is given and the characteristics of each class are examined. (2) The relation between drought in summer in Kagawa Prefecture and the total rainfall amount in summer at Tadotsu is examined (see Table 4). Some empirical rules related to the forecasting of drought are also discussed. *Subject Headings:* **1. Drought 2. Drought forecasting 3. Kagawa Prefecture, Japan.**—*Author's abstract.*

7.3–235 551.577.38:551.513.3

Gōda, Isao, **On the drought in summer, Pt. 2. The meteorological conditions during the period of drought in summer in Western Japan.** *Journal of Meteorological Research,* Tokyo, 6(8):369–374, Nov. **1954.** 4 figs., 2 refs. In Japanese; English summary p. 369. **DWB**—The author chiefly studied the aerological conditions during the period of drought in summer in Western Japan, using the meteorological data from 1947 to 1951, except 1949. And further the upper charts of 1951 and 1947 (i.e., years of drought) were compared with those of 1950 and 1948 (i.e., normal years). The results obtained are as follows: 1) Dr. ARAKAWA has pointed out that the high level anticyclone is the cause of the drought, when the upper high (or ridge) appears in the middle and upper troposphere at altitudes greater than 700 mb at least over Western Japan. In normal summer, the upper high with warm area is stagnant over Eastern Japan or over the sea off Eastern Japan. But when the upper high pressure with warm area reaches Western Japan from the sea off Eastern Japan, the period of drought begins. 2) It can be said that the distribution of precipitation in percentages of the normal during Aug. in all of Japan is closely related to 100 mb contours. *Subject Headings:* **1. Drought 2. Meteorological conditions during drought 3. Western Japan.**—*Author's abstract.*

7.3–236 551.577.51

Kodama, Ryozo, **On the orographic rain on the slopes of Mt. Ibuki (first paper).** *Journal of Meteorological Research,* Tokyo, 6(8):333–338, Nov. **1954.** 3 figs., table, 6 refs. In Japanese; English summary p. 333. **DWB**—During the three summers of the years 1951–1953, the author and others observed the rainfall on the slopes of Mt. Ibuki and analyzed the distribution of the orographic rain. In this paper the results of observation on the southern slope are examined. 1) The maximum of total amount is found at the heights of 900–1000 m and its amount is 1.40 times as large as that at the foot (165 m) of the mountain and 1.13 times as that at the top (1375 m). 2) The vertical distribution of rainfall amount along the mountain slopes is classified into four types as shown in Fig. 2. *Subject Headings:* **1. Orographic rainfall 2. Mt. Ibuki, Japan.**—*Author's abstract.*

## RAIN AND SNOW

7.3–237 551.578.11

Telford, J. W., **A new aspect of coalescence theory.** *Journal of Meteorology,* 12(5):436–444, Oct. **1955.** 7 figs., table, 10 refs., 10 eqs. **DWB**—In a cloud water is not uniformly distributed but is grouped in discrete droplets. These are assumed to be initially of two sizes, one twice the volume of the other. The random capture of the smaller by the larger drops leads to a complete raindrop spectrum in a relatively short time. "Under typical conditions, drops of 23 micron radius can form in the order of 5 minutes in a cloud of droplets of 10 microns." Free-fall coalescence may therefore account for the formation of rain without any

other mechanism. "A few drops are likely to reach rupture size in reasonable times. These may be important in chain-reaction processes." *Subject Heading:* **1. Coalescence theory.**—*C.E.P.B.*

7.3–238 551.578.4:576.8:016

†U. S. Snow, Ice and Permafrost Research Establishment, **Micro-organisms in snow, ice and frozen ground.** Its *Special Bibliography*, 55-1, Jan. **1955.** 9 p. Also: **Supplement,** April **1955.** 8 p. **DLC**—An annotated bibliography of about seventy items which include papers on bacterial contamination of snow, ice and frozen ground, on snow insects, on diatoms in ice, on the ecology of microorganisms in ice and snow, etc. *Subject Headings:* **1. Micro-organisms in snow 2. Microorganisms in ice 3. Bibliographies.**—*I.L.D.*

7.3–239 551.578.89:551.510.42

Armour Research Foundation, Chicago, **A field study on the scavenging of dust by rain.** Contract AF 19(122)-472, Project C 022, Scientific Report, No. 15, Oct. 26, **1954.** 33 p. 10 figs., 7 tables. **MH-BH**—The scavenging action of natural rain upon dust suspended in the atmosphere has been studied at a field program carried out at Pt. Chehalis in the State of Washington. Fluorescent tracer dusts were released from an aircraft flying at 500 ft during rain storms. Rain falling through the fluorescent dust was sampled by an extended line of rain collectors located downwind from the release path, and the quantity of fluorescent dust collected by the rain was measured. The experimental plan and the equipment are described with the aid of diagrams and photographs. *Subject Headings:* **1. Dust removal by rain 2 Chehalis, Wash** —*Based on author's abstract.*

## HYDROMETEOROLOGY

*See also:* **Agric. hydrology** (U. S. Dept. of Agric.), **7.3–4**; **Clim. & hydrol. records of Weather Bureau** (Pinkett et al.), **7.3–12**; **Evaporation from reservoirs** (Braslavskiĭ, Vikulina), **7.3–15**; **Hydrological research** (Blanc et al.), **7.3–248**; **Forest strip effects** (Kalashnikov), **7.3–274.**

7.3–240 551.579:63

**Gidrologicheskoe obespechenie sel'skogo khoziaĭstva na uroven' novykh zadach** [Hydrometeorological service for agriculture to meet new demands.] *Meteorologiia i Gidrologiia*, No. 2:3–6, March/April **1955 DLC**—A program for the role of the hydrometeorological service in the intensified development of Soviet agriculture is outlined. This implies the study of the climatic and water resources of virgin and fallow soils, the preparation of climatic summaries, determination of sowing dates for the fall periods, and the moisture and heat requirements of crops, etc. The investigation of the agroclimatic conditions necessary for the cultivation of maize in the new areas of northern Kazakhstan and southern Siberia is stressed. The cooperation of forecasters, agricultural meteorologists, hydrometeorological stations and collective and state farms is discussed. The method of T. S. Mal'tsev for utilizing virgin soils by taking into account climatic and hydrologic conditions is mentioned. *Subject Headings:* **1 Hydrometeorological services 2. Agricultural meteorology 3. U.S.S.R.** —*I.L.D.*

7.3–241 551.579.4:551.553.21(54)

§Parthasarathy, K. (*India Met. Dept., New Delhi*), **Floods in Bihar, Bengal and Assam during July and August 1954.** *Journal of Scientific and Industrial Research, New Delhi, Sec. A*, 14(3):115–119, March **1955.** map, 2 charts, 2 refs. **DWB**—This attempt to analyze synoptically the disastrous flood includes no quantitative comparison since regular gage and run-off data are only from 1947. Two synoptic charts (July 12 and Aug. 23) are given along with a map indicating the 25,640 sq mi area affected by the flood. When the monsoon moves so its trough lies over the hills, there is a break in the rain over the plains while the hills and submountain regions suffer heavy rains. This situation is known as a "break" in the monsoon, which results in the flood. Three low pressure areas moving in on the E. Himalayas July 20–29 intensified the rain and, quite unusual for this period (July 23–26), a fresh monsoon air mass

rom the Bay of Bengal to the Nepal Himalayas gave extreme rain intensity. Concludes hat "breaks" are not unusual and are always associated with long spells of heavy rain over Kosi and other Himalayan basins. The weather in the Ganges plains and in the Himalayas s not subject to any change. *Subject Headings:* **1. Monsoon floods 2. Monsoon fluctuations . India.**—*W.N.*

7.3–242 551.579.5:551.563

†*Alpat'ev, A. M., **Vlagooborot kul'turnykh rastenii.** [Moisture exchange in crops.] Leningrad, Gidromet. Izdat., **1954.** 247 p. 24 figs., 80 tables (+12 in append.), 167 refs. **DLC**—A comprehensive monograph on the problem of sufficient moisture conditions for cultivated plants in connection with climate and other natural factors. Ample discussion is given of methods for determining the moisture requirements of plants, particularly of grain crops, in geographical aspect, and verification of these methods in various natural zones. The most important topics discussed are: 1) criteria of transpiration, 2) factors determining the need of water in plants under conditions of optimal soil moisture, 3) total need of water during growing season under conditions of optimal moistening, 4) water consumption by plants as conditioned by the medium and biological development, 5) water exchange in plants in connection with agricultural technique and the influence of species and 6) factors determining the total intake of water by plants under conditions of nonoptimal moistening. A simple method for determining the requirements of water for plants in field conditions from climatological data is suggested. This makes it possible now to determine the surplus or deficiency of moisture in geographical scale in absolute units. *Subject Headings:* **1. Soil moisture requirements 2. Transpiration 3. Plant water requirements 4. Grain crops.**—*N.A.S.*

7.3–243 551.579.5:628.11

*Baden, W. and Eggelsmann, R. (*both Bremen*), **Zur Frage der Wasserreserven unserer Moorböden im Frühjahr.** [The water reserves of our moorlands in spring.] *Wasserwirtschaft*, Stuttgart, 45(9):228–231, June **1955.** 2 tables, 2 figs. **DWB**—*See also* 1954 paper by S. Uhlig (7.3–246 below). A table gives the % departures of monthly precipitation from 40-year mean values for a "moor" station (Königsmoor, Harburg, N.W. Germany) for 1951, 1952, 1953 and 1954, showing that 1951 was very moist, 1952 was normal, 1953 dry in spring and autumn and 1954 dry in spring and moist in autumn. The soil moisture expended in these years was 154, 148, 243 and 250 mm. respectively. The depletion of ground water supply each month is shown cumulatively by curves for each year. Also the difference between structure (air, moisture maximum and minimum and substance) of a grass culture and an uncultivated moor is shown diagrammatically (% volume). *Subject Headings:* **1. Soil moisture supply of moors 2. Ground water storage 3. Königsmoor, Harburg, Germany.**—*M.R.*

7.3–244 551.579.5:581.03

Hounam, C. E., **Determination of the end of the growing season.** *Australia. Bureau of Meteorology, Meteorological Study*, No. 4, April **1955.** 16 p. 5 figs., 2 tables, 16 refs., eqs. **MH-BH**—The purpose of this study was to estimate the moisture conditions of the soil during the growing season and the date on which soil moisture reserves were exhausted over a period of years and to establish a normal end of growing season at selected stations in Victoria. The contents of this study include the following: definition of growing season, the inadequacy of average monthly rainfall as a measure of the length of the growing season, the concept of effective rainfall, the combination of effective and average rainfall for determining the growing season, the application of daily rainfall data to determine growing season and its correction for evapotranspiration losses, the graphical presentation of rainfall-evapotranspiration decline curves, determination of end of growing season from curves and the comparison of calculated dates with observational data. *Subject Headings:* **1. Growing season 2. Soil moisture determinations 3. Evapotranspiration.**—*I.L.D.*

7.3–245 551.579.5(08):628.11

**Symposium on ground-water resources.** *Journal of Scientific and Industrial Research, New Delhi, Sec. A*, 14(4):186–189, April **1955.** **DWB**—Nearly 60 papers were delivered before the symposium at New Delhi, Feb. 1–2, 1955. Contributions from U. K., U. S.,

Netherlands and Ceylon included ground-water reserves, supplementation of resources, hydrographic surveying, organization and methods. More than ¾ of the Indian area yields from moderate to low water-supply due to the hard rock formations. Utilization of wind power for pumping water from wells is feasible if the wind velocity is 4 mph. The cost of windmills versus profit may retard installations. Successful development of water supply depends largely on skilled laborers and personnel. *Subject Headings:* **1. Ground water resources 2. Symposia.**—*W.N.*

7.3–246 551.579.5:628.11

Uhlig, Siegfried, **Die Wasserreserven unserer Böden im Frühjahr.** [Water reserves in our soils in spring.] *Wasserwirtschaft*, 44(8):207–211, May **1954.** 3 figs., tables, 5 refs. **DLC**—Criticizes ALBRECHT's and THORNTHWAITE's assumption that 100 mm is the water reserve in the soil which can be used by plants and shows on the basis of actual measurements that this value varies with types of soils, averaging about 200 mm from which 20 mm might be lost by percolation. Since the wilting point is not reached every summer in Central Europe, 150 mm might be the average contribution of soil moisture to evapotranspiration. The spring-time water reserves are estimated for different regions of Germany on the basis of the percentage of different soils. *Subject Headings:* **1. Soil moisture reserves 2. Thornthwaite's method 3. Germany. I. Albrecht, F.**—*A.A.*

# CLIMATOLOGY AND BIOCLIMATOLOGY

## CLIMATOLOGY

*See also:* **Physical geog. & clim.** (Horrocks), 7.3–8; **Climatology** (Misolavljevic), 7.3–17; **Climatology** (Leighly), 7.3–43.

7.3–247 551.58:519.2

*Berényi, Dénes, **Újabb statisztikai módszerek alkalmazása a klimatológiában.** [New statistical methods in climatology.] *Időjárás*, Budapest, 58(5):261–272, Sept./Oct. **1954.** 2 figs., 3 tables, 10 refs. **DWB**—The statistical method called analysis of variance is explained. The method involves comparison of standard deviations in long series and in subdivisions of such series. The purpose of the method is to determine the homogeneity or lack of homogeneity of climatic series and especially to identify climatic variations. Temperature records from 7 Hungarian stations and from Vienna and Prague are analyzed by means of this method. All of these records show a shift in the temperature trend (decreasing before and increasing after the shift) at dates varying from 1888 to 1896. *Subject Headings:* **1. Statistical methods in climatology 2. Homogeneity 3. Temperature trends.**—*G.T.*

## CLIMATE OF PARTICULAR PLACES

*See also:* **Climatological data of Venezuela** (Gonzalez), 7.3–16; **Climatology** (Milosavljevic), 7.3–17; **Island bibliographies** (Sachet, Fosberg), 7.3–52.

7.3–248 551.582(662) 551.579.4(662)

†Blanc, Maurice; Daget, Jacques and d'Aubenton, François, **Recherches hydrobiologiques dans les bassin du Moyen-Niger (Pt. 1 of 1954 Mission M. Blanc-F. d'Aubenton).** [Hydrobiological research in the basin of the middle Niger, Pt. 1 of the 1954 M. Blanc-F. d'Aubenton Mission.] *Institut Français d'Afrique Noire, Dakar, Bulletin, Ser. A.*, 17(3):679–754, July **1955.** 14 photos, 29 figs., 8+tables, 26 refs. **DWB**—Meteorological conditions (precipitation, temperature and humidity) are discussed on p. 690–696, and floods of the Niger on p. 696–700. Charts show mean annual precipitation in West Africa, and annual rainfall regime at Tilembeya (near Diafarabe) for 1951, 1952, 1953 and 1954, respectively, and temperature and humidity regime for each of these years for that station. Air and water temperature variations are discussed and plotted on p. 708–718. *Subject Headings:* **1 Climate of Middle Niger Basin 2 Water temperatures 3. French West Africa 4. Tilembeya, French West Africa** —*M.R.*

7.3–249 551.582:551.585(988)

†Bocher, Tyge W., **Oceanic and continental vegetational complexes in Southwest Greenland** *Denmark. Kommission for Videnskabelige Undersögelser i Grønland*, 148(1), **1954** 36 p. 74 figs. (incl. photos), 39 tables, bibliog. p. 314–321. Price: Kr. 50.00. On t-p: Den Botaniske Ekspedition til Vestgrønland, 1946. **DWB**—In this elaborate ecological monograph there is a climatological survey (p. 17–24). Five climatic types are recognized and defined for S. and S.W. Greenland. (A) Low Arctic Oceanic, (B) Low Arctic Suboceanic, (C) Low Arctic-subarctic continental, (D) Low Arctic subcontinental, and (E) Subarctic oceanic-suboceanic. Data for 11 stations (shown on chart) are analyzed and discussed. Snow depth, temperature, wind frequency, precipitation and number of days of precipitation at Söndre Stromfjord and snow cover and air and snow temperature, under varying cloud conditions are given for 6 stations around Söndre Strømfjord Air Base in 1953 (Feb.–April). *Subject Headings:* **1 Climate of Southwest Greenland 2. Climatic types 3. Söndre Strømfjord, Greenland.**—*M.R.*

7.3–250 551.582:620.1(798)

*de Percin, Fernand; Falkowski, Sigmund and Miller, Rex C., **Handbook of Big Delta, Alaska, environment.** *U. S. Quartermaster Corps. Research and Development Center. Environmental Protection Division, Technical Report, EP-5*, April **1955.** 57 p. 46 figs. (incl. photos), 7 tables, 16 refs. **DWB**—Climate and weather at Big Delta are discussed systematically on the basis of 1944 to 1948 data from the point of view of testing materials for military requirements. The winters are long, cold and dry; the summers, warm and damp. In 1947 there was a range in temperature of 150°F from Jan. to May (−60° to +90°F). Snow is not as a rule deep, except in forested areas. Data are presented in analytical tables and graphs. Photographs show terrain, vegetation and snow cover types. Monthly solar radiation intensity, sunshine duration, windchill, wind roses, sky cover, snowfall and precipitation frequencies are shown on full page complex graphs. *Subject Headings:* **1. Climate of Big Delta, Alaska 2. Materials testing 3. Big Delta, Alaska.**—*M.R.*

7.3–251 551.582:63(47)

Krylov, N. V., **K teorii i praktike kompleksnykh geograficheskikh issledovaniĭ dlia sel'skogo khoziaĭstva.** [Theory and practice of complex geographical investigations for agriculture.] *Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia*, 87(1):3–10, Jan./Feb. **1955.** table (fold.). **DLC.** German translation as **Theorie und Praxis komplexer geographischer Forschungen für die Landwirtschaft,** in *Petermanns Geographische Mitteilungen*, 99(3):243–247, **1955. DLC**—This work deals first with the philosophy and economics of agriculture. Among the interacting physico-geographical factors are climate and hydrology, rainfall, runoff, solar energy and atmospheric circulation. The region chosen for special study was a small area (16 sq km) in the northern Ladoga, rich in lakes. A large folding table sets out for 9 districts the landscape, hydrology, soils, natural vegetation and climate. *Subject Headings:* **1. Agricultural climatology 2. Ladoga Region, U.S.S.R.**—*C.E.P.B.*

7.3–252 551.582.1(529)

Willis, W. B. (*Hqt. Air Weather Service, Wash., D. C.*), **The weather of Formosa.** *Weatherwise*, 8(2):39–43, 58, April **1955.** 5 figs., table. **DWB**—A general discussion of topography, seasonal weather conditions, precipitation, cloudiness, visibility, temperature, humidity, winds, typhoons, sea conditions and icing in and around Formosa. Generalized isohyetal and air flow charts for summer and winter illustrate the monsoonal character of the weather regime. *Subject Headings:* **1. Climate of Formosa 2. Formosa.**—*M.R.*

7.3–253 551.582.2(612.3)

Gentilli, Joseph, **Libyan climate.** *Geographical Review*, N. Y., 45(2):269–271, April **1955. DWB, DLC**—This is a review of Fantoli, Amilcare, **I valori medi della temperatura in Libia** [Average temperatures in Libya], *Società Geografica Italiana, Bolletino*, Ser. 8, 7:59–71, **1954.** It is a noncritical review of FANTOLI's second major contribution to the climatology of Libya (the first, on rainfall, was abstracted as 4.10–4, Oct. 1953, *MAB*). The review is really a

summary of average and extreme climatic conditions in Libya. Rainfall as well as temperature conditions are mentioned in review. *Subject Headings:* **1. Climate of Libya 2. Reviews 3. Libya.**—*M.R.*

## CLIMATIC CHANGES

*See also:* **Pluvial periods** (Hombek), 7.3–232.

7.3–254 551.583:551.311.12

Albertini, Renzo, **Sull'estinzione dei laghi glaciali del gruppo Ortles-Cevedale.** [Disappearance of glacial lakes from the Ortles-Cevedale group.] *Congresso Geografico Italiano 15th, Turin, April* 11–16, 1950, *Atti*, p. 219–225. pub. **1952.** 7 refs., tables. **DWB**—Evidence of alpine lakes which exist or which existed during past centuries and which are now extinct is examined and discussed, and statistics on these lakes tabulated by basins, elevation and degree of existence (186 current, 12 destined for rapid extinction, 24 extinct before 1600 A.D., and 73 extinct since 1600 A.D.). *Subject Headings:* **1. Glacial lake extinction 2. Climatic changes 3. Italian Alps.**—*M.R.*

7.3–255 551.583:551.526.6(729)

**Caribbean warmed up suddenly 10,000 B.C.** *Science News Letter*, 67(17):265, April 23 **1955. DWB**—Radio-carbon datings of deep sea sediments carried out by the U. S. Geological Survey Laboratory show that the Caribbean Sea suddenly warmed up to the temperatures of today. It used to be about 9°F colder for a long period at earlier times. *Subject Headings:* **1. Warming of the Caribbean 2. Radiocarbon dating 3. Caribbean Sea.**—*W.N.*

7.3–256 551.583:019.941

†Nishioka, Hideo, **Kandan no Rekishi.** [Recurrence of cold and warm period.] Tokyo Kogaku-Sha, **1949.** 205 p. 14 figs., 24 tables, 8 plates (incl. photos.), numerous refs. throughout text, bibliog. at end of text. In Japanese. **DLC.** Also: Taguchi, Tatsuo, **Criticism on Nishioka's theory on climatic change for 700-year period in Japan.** *Seppyo* (*Snow and Ice*) Tokyo, 12(2):37–45, **1950.** figs., tables. In Japanese. **DWB—1)** Climatic changes since ca 1000 B.C. as revealed by Japanese documents and anthropology are given and the existence of periodic change with about 700-years period is suggested to explain these data. 2) Author strongly criticizes and rejects Nishioka's theory on climatic change for 700-year period in Japan, after quoting voluminous old Japanese documents. *Subject Headings:* **1. Climatic changes 2. Reviews 3. Japan.**—*H. Arakawa.*

7.3–257 551.583:523.74

Ogasawara, Kazuo, **On the frequency of abnormal weather in Tohoku District.** *Seppyo* (*Snow and Ice*), Tokyo, 12(1):187-192, **1950.** tables. refs. In Japanese. **DWB**—After reviewing the theories on climatic change related to sunspot cycle activity and vulcanism, BRÜCKNER's 35-year cycle and 35-year cycle of cool summers in Northern Japan is criticized. In Table 2, the famine years from 1600 up to the present date in Tohoku District are given in chronological order. *Subject Headings:* **1 Climatic variations 2 Abnormal weather conditions 3 Sunspot cycles 4. Brückner's cycle 5. Tohoko District, Japan** —*H. Arakawa.*

7.3–258 551.583:551.311.12

**To study earth's heat.** *Science News Letter*, Wash., D. C., 67(13):206, March 26, **1955. DLC**—The earth has warmed up 2.2°F during the past 50 years, which may be attributed to man-made increase of atmospheric carbon dioxide. The problem may be solved if it can be determined whether or not the 5,500,000 sq mi ice cap in the Antarctic is retreating. This will be studied by 38 nations during the forthcoming International Geophysical Year. *Subject Headings:* **1 Climatic variations 2. Glacier retreat 3. Carbon dioxide.**—*W.N.*

7.3–259 551.583.2

**Evidence uncovered for linking the Iranian Plateau with the Indus Valley.** *Science News Letter*, 68(2):19, July 9, 1955. **DLC**—Five thousand year old pottery found in Mekran

nd at Mohenjo-Daro on the Indus River is very similar to that found at Kish and Ur of he Chaldees in Iraq. Since water is scarce in Mekran, it is suggested that the climate was different with more rain in the Chalcolithic times than the present 7 in. of annual rainfall. Other activities of the Peabody Museum-Harvard Expedition to Pakistan are discussed briefly. *Subject Headings:* **1. Climatic changes 2. Iraq.**—*W.N.*

## MICROCLIMATOLOGY

*See also:* **Local wind conditions** (Aulitzky), 7.3–199; **Soil climates** (Schaufelberger), 7.3–263.

7.3–260 551.584.3

Huss, Ed., **Kleinraummeteorologische Studien im Federseegebiet in Strahlungsnächten** [Micrometeorological studies in the Federsee region on radiation nights.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(4):329–352, **1955.** 13 figs., 7 refs. German, English and French summaries p. 329–330. **DWB**—The Bodensee Aerological Observatory was reestablished in 1944 in the Federsee region, flat meadow and peat 5×10 km surrounded by hills 50 m high, giving rapid night cooling. The cold air mass was not quiescent; a whole sequence of small waves could be followed in streaks of fog. Some of these moved with a speed of 1–3 m/s, some resembled seiches, while on the bordering slopes squall fronts developed. The phenomena were followed by autographic and other instruments and several examples are described, including one of an incursion of warm air from aloft. *Subject Headings:* **1 Micrometeorological research 2. Federsee Region, Germany.**—*C.E.P.B.*

7.3–261 551.584.3:551.524:551.571:551.573

Reichelt, G., **Zum Einfluss der Bewässerung auf das Mikroklima von Mittelgebirgswiesen.** [Influence of irrigation on the microclimate of Mittelgebirge meadows.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(4):374–399, **1955** 9 figs., tables, 20 refs. German, English and French summaries p. 374–376. **DWB**—Observations of temperature (0, 2, 10, 100 cm), soil temperature (5 and 30 cm) and in and out radiation with vegetation of different heights were made in watered and unwatered meadows sloping to S and NNE. The effect of watering was to moderate the climate near the ground very greatly (range at 0 cm in summer, unwatered, $12\frac{1}{2}$–$52\frac{1}{2}$°C; watered, 13–25°C.), but the effect decreased rapidly with height. In winter watered plots were always warmer than unwatered; in spring, snow melted sooner and frost was avoided, permitting earlier growth. Watering increased humidity within the crop (but not above) and reduced evaporation. Summer watering is only necessary on slopes facing S or SSW, not NNE. *Subject Headings:* 1 **Irrigation effects 2 Field microclimatology 3 Mittelgebirge, Germany**—*C.E.P.B.*

## CLIMATIC CLASSIFICATION

*See also:* **Synoptic analysis** (Watts), 7.3–126; **Thornthwaite's classification** (Sansom), 7.3–217; **Climatic types** (Böcher), 7.3–249.

7.3–262 551.585:551.43:525.5

*Balseinte, Raymond, **Une définition de l'année climatologique en montagne** [A definition of the climatological year in the mountains.] *Revue de Géographie Alpine*, Grenoble, 43(2): 449–454, **1955.** tables. **DWB**—Since 3 different "years" are used in meteorology, hydrology and agriculture, the author suggests a logical basis for defining a climatological year for the Savoy Alps. Data on snow and thunderstorms from 7 stations (250 m to 1390 m) in Savoy are reduced to percentages and rearranged so as to reveal 1 Nov. to 30 Oct. as the logical climatological year, and 1 Nov. to 30 April the cold season (snow), 1 May to 30 Oct. the warm (thundery) season, and quarters as follows: winter: Nov.-Jan., spring: Feb. April, summer: May-July and autumn Aug.-Oct. These seasons also correspond to temperature seasons in Alps. *Subject Headings:* **1. Climatic seasons 2. Alpine climatology 3. Savoy, France.**—*M.R.*

7.3–263 551.585 551.584.7

*Schaufelberger, P., **El factor de Lang y su aplicación en Colombia.** [Lang factor and its application in Colombia.] *Centro Nacional de Investigaciones de Café, Chinchina, Colombia, Boletín Informativo*, 6(65):160–169, May **1955.** 2 figs., 6 tables, 10 refs. **DWB**—The climates of Colombia are classified according to several systems, but mainly the system of LANG (1915) which uses temperature and precipitation as critical factors, giving 5 climatic zones for the country as a whole. A brief biography of RICHARD LANG is included. Data for Colombia according to systems of TROLL-LAUER and VILA are presented in tables and graphs. The system of LANG is considered more applicable to pedology than those systems taking only precipitation into account. The reason is the marked effect of altitude. *Subject Headings:* **1. Soil climates 2. Lang's classification 3. Biography 4. Colombia 5. Lang, Richard.** —*M.R.*

7.3–264 551.585.7:551.43(515)

Gu, Shen'-siu, **Priroda Tibetskogo nagor'ia.** [Physical geography of Tibetan highlands.] *Priroda*, Moscow, 44(2):64–72, Feb. **1955** 5 figs. **DLC**—In addition to a description of the geomorphology, relief, soils and vegetation of Tibet, the author gives a qualitative description of the general climate of this region, of the variation of the snow line, of the mountain climate above 15,000 ft and of the climate of humid forests. *Subject Headings:* **1 Climate of Tibet 2. Mountain climates 3. Snow line 4. Tibet.**—*I.L.D.*

7.3–265 551.585.7:0

Kirigin, Božidar (*Zagreb*), **Trecé medunarodno zasjedanje za alpsku meteorologiju Davos 12–14. IV. 1954.** [Third International Conference on Alpine Meteorology in Davos April 12–14, 1954.] *Yugoslavia. Hidrometeorološka Služba, Vesnik*, 3(3/4):88–90, July/Dec. **1954. DWB**—Some 150 representatives of ten countries and of WMO were present at the Third Conference on Alpine Meteorology held in Davos in April 1954. Lectures were delivered in the fields of synoptic and physical meteorology, radiation, bioclimatology, snow and ice. Visits to the Swiss Institute for Snow and Avalanche Research (Weissfluhjoch) and the Institute for Radiation Research (Davos) were offered. A ROCH, a member of the Swiss expedition to the Himalayas in 1952, gave a lecture. *Subject Headings:* **1. International Conference on Alpine Meteorology, April 12–14, 1954 2. Alpine meteorology.**—*G.T.*

## BIOCLIMATOLOGY

7.3–266 551.586:551.59

Reiter, R., **Ergebnisse synoptisch-luftelektrischer Untersuchungen im Ostalpenraum im Frühjahr und Sommer 1950.** [Results of synoptic atmospheric electricity investigations in the eastern Alps in spring and summer 1950.] *Zeitschrift für Meteorologie*, 9(8):240–24 Aug. **1955.** 5 figs., 11 refs. **DLC**—Since 1950 measurements of vertical current at Munich and atmospheric electric field at 4 stations (535–1618 m) have been made. Examples are shown of the rapid variations of potential gradient in a cold front or a labile stratification with thunder but no front. Warm fronts and stable stratification gave a persistent negative field. Comparison of hourly means showed a decrease of range and retardation of extrema with increasing height. The definition of "synopsis" in atmospheric electricity is discussed. *Subject Headings:* **1. Atmospheric electricity measurements 2. Potential gradient variation 3. Bavarian Alps.**—*C.E.P.B.*

7.3–267 551.586:541.1:551.590

Piccardi, Giorgio, **Über einen Zusammenhang zwischen atmosphärischen und kosmischen Phänomenen und physikalisch-chemischen Prozessen.** [A relation between atmospheric and cosmic phenomena and physical-chemical processes.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(4):486–505, **1955.** 10 figs., 10 refs. German, English and French summaries p. 486–487. Also: Burkard, O., **Einige statistische Versuche Piccardischer Fällungsreaktion.** [Some statistical experiments on the Piccardi precipitation reaction.] *Ibid.*, 506–510. 2 figs., 2 refs. German, English and French summaries p. 506. Also: Becker, Udo, **Ein Zusammenhang zwischen der Fällung von Wismutoxychlorid (anorganisch**

Test von Piccardi) und der Sonnentätigkeit. [A connection between the precipitation of bismuth oxychloride (Piccardi's inorganic test) and solar activity.] *Ibid.*, 511–516. 6 figs., 2 tables, 3 refs. German, English and French summaries p. 511. Also: Mosetti, F., **Periodizitäts-analyse der Beobachtungsreihen der Piccardi'schen Fällungsreaktion.** [Periodicity analysis of observations of the Piccardi precipitation reaction.] *Ibid.*, 517–522. 3 figs., 5 refs. German, Italian, English and French summaries p. 517–518. **DWB**—Piccardi's simple differential method is as follows: "Series of precipitations with BiOCl are simultaneously made with normal and with activated water at identical conditions, whereby is counted the number of the faster and of the slower precipitations in the activated water; the temporal variations of the percentage of the faster precipitations are studied. The experiments have been carried out with the following two conditions: (1) in a room free of any metal, (2) in a room isolated with metal. The differences in the results prove that the variations obtained are due in fact to the influence of exterior factors. Has been ascertained: a secular variation which might be in connexion with the sunspot activity, an annual variation which might be in connexion with the earth's rotation, and several smaller variations which may be in relation with different elements. There are found correlations with the atmospheric pressure, with the potential gradient of atmospheric electricity and with the intensity of cosmic radiation. Is found, in addition, that the nature of the metal screen is of importance. It was determined also an effect of latitude from observations carried out at Florence, Brussels and Vienna. The investigation of the effect of the metal screen, by a simplified test without activation, has shown that in general the BiOCl precipitation is going on more rapidly when using the screen, and that there is a relation between the specific electrical conductivity of the metals used and the effect of screening." Burkard compared Piccardi's reaction with height of 96 mb level, 1000–500 mb topography and geomagnetic disturbances. Slight negative relations were found but not statistically proved. Becker found a correlation of 0.9 between rate of precipitation and sunspot activity and an increase of unscreened rate after chromospheric eruptions. Mosetti analyzed Piccardi's figures and found 12 periodicities ranging from 2.01 to 116 days, forming the sequence $T_n/T_{n+1}=1.41$. *Subject Headings:* **1. Bioclimatic research 2. Cosmic influences 3. Physico-chemical relationships.**—*Author's abstract, C.E.P.B.*

7.3–268 551.586:577.39

†Aschoff, Jurgen, **Exogene und endogene Komponente der 24-Stunden-Periodik bei Tier und Mensch.** [Exogenous and endogenous components of the 24-hour periodicity in animals and man.] *Naturwissenschaften*, 42(21):569–575, Nov. 1, **1955.** 4 figs., 37 refs. **DWB**—Under constant conditions animals and man show an average periodicity of 24 hrs, due partly to alternation of day and night, temperature and many other meteorological factors. Travel along a degree of latitude brings adaptation to local change; adaptation to a sudden change of 180° takes about 8 days, but may be incomplete in man if the time-scale is unaltered. The alternation of day and night is by far the most important factor. *Subject Headings:* **1. Bioclimatology 2. Photoperiodism.**—*C.E.P.B.*

7.3–269 551.586:612

†Würfel, H., **Über den Einfluss der Witterung auf den Menschen.** [The influence of weather on man.] *Zeitschrift für Meteorologie*, 8(4):111–122, April **1954.** 3 figs., table, 43 refs. **DWB**—Article reviews literature on various aspects of influence of weather on human "feelings," both physiological and psychological, and gives data from a case of a normal individual (the author, who was 33 years old) who was kept under close observation during the period Dec. 1952 to Nov. 1953 in the Berlin-Buch area. Climatic effects, especially due to heat balance of the body (first studied quantitatively by J. V. Vincent in Belgium in 1900), are discussed under the headings of cooling power, equivalent temperature, and sultriness. The methods of treatment of weather elements and of integrating them in terms of comfort, etc. are set forth in detail in text and elaborate graphs, and the findings are analyzed. The year 1952–53 is compared in respect to weather influences with the normal period (1901–1930) and the statistics of percentage of time certain subjective "feelings" were noted interpreted with respect to weather and possible anomalies of the influential weather conditions. *Subject Headings:* **1. Physiological climatology 2. Psychological effects of weather 3. Weather and man.**—*M.R.*

7.3–270 551.586:612.014.43

Fraser, D. C. and Jackson, K. F., **Effect of heat stress on serial reaction time in man.** *Nature*, London, 176(4490):976-977, Nov. 19, **1955.** table, 2 refs. **DWB**—Serial reaction times of 7 subjects to stimuli were tested over 5 days in temperatures of 90–104°F. Reaction times were 0.256 sec in first hour and 0.267 sec in second hour, compared with 0.247 in control. This gives a clear-cut index of psychomotor change under heat stress. *Subject Headings:* **1. Bioclimatology 2. Heat effects on man.**—*C.E.P.B.*

7.3–271 551.586:612.2

†Ungeheuer, Hans, **Ein meteorologischer Beitrag zu Grundproblemen der Medizin-Meteorologie.** [Meteorological contribution to the fundamentals of medical meteorology.] *Germany. Deutscher Wetterdienst, Berichte*, 3(16), **1955.** 32 p. 23 figs., 7 tables, 42 refs. **DLC**—After reviewing briefly the fundamental problem of medical-meteorological weather analysis, the author presents the Tölz technique of medical meteorological analysis. It is based upon the presupposition that a relationship exists between mean rhythmical weather processes produced by the diurnal and annual variations of the meteorological elements and the annual and daily variation of biological processes so that aperiodic weather disturbances produce aperiodic vital disturbances. Local weather is classified into six weather phases; their interrelationship is analyzed in particular with reference to the temperature-humidity environment. The relationship between the individual weather phases and various biological phenomena is examined with reference to milk and fat production of cows, throat, nose and ear diseases, stomach operations, intraocular pressure, general well being, scholastic performance, sensitivity to pressure pain, protein reaction in blood serum, capillary resistance, blood pressure, industrial accidents, etc. *Subject Headings:* **1. Medical meteorology 2. Weather sensitivity.**—*I.L.D.*

7.3–272 551.586:616.921.5

†Cordes, H., **Die Grippe und ihre Beziehung zu atmosphärischen Einflüssen.** [Influenza and its relation to atmospheric conditions.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(4):462-485, **1955.** 3 tables, 46 refs. German, English and French summaries p. 462–463. **DWB**—Weekly influenza statistics in Bavaria 1948/9 to 1952/3 are compared with weather at Bad Kissingen. The genesis of epidemics requires stationary anticyclonic conditions (small rainfall on many successive days, light winds, saturated air early and late, and stable stratification). The spread of the epidemic is favored by a succeeding period of cyclonic weather, which lowers resistance. The word-wide propagation of epidemics is due to the slow migration of high pressure areas. Much literature is discussed. *Subject Headings:* **1. Weather and epidemics 2. Influenza.**—*C.E.P.B.*

## ENVIRONMENTAL INFLUENCES

*See also:* **Sunshine distrib.** (Thams), 7.3–87; **Local wind conditions** (Aulitzky), 7.3–199.

7.3–273 551.588.6 634:06

**Fourth World Forestry Congress.** *Journal of Scientific and Industrial Research, New Delhi, Sec. A*, 14(3):120-125, March **1955. DWB**—This is a brief report from the Congress at Dehra Dun, India, Dec. 11-22, 1954. Several international organizations were represented at the congress attended by 426 delegates of whom 205 were from 52 foreign countries. The 130 papers discussed covered various aspects of the following topics: (1) Protective role of the forest, (2) Productive functions of the forest, (3) Utilization of forest products and (4) Tropical forestry. Several subjects of meteorological interest were discussed, e.g., forest influence, shelter belts, soil and water conservation, tropical rain forest, etc. *Subject Headings:* **1. Forest influences 2. Fourth World Forestry Congress, Dehra Dun, India, Dec. 11-22, 1954.**—*W.N.*

7.3–274 551.588.6:551.579.5

Kalashnikov, A. F., **Polozhitel'noe vliianie lesnykh polos na vlazhnost' predkavkazskikh chernozemov v teplyĭ period goda.** [Favorable influence of forest strips on the humidity of

Northern-Caucasian chernozems in the warm period of the year.] *Pochvovedenie*, Moscow, No. 6:74–82, June 1955. 3 figs., 6 tables, 5 refs. DLC—The climatic conditions during 1948–49, the period of experimentation, and the experimental procedure are described. Data are presented on the reserve of productive moisture in the soil of fields protected by a ten-row forest strip, variation in reserve of soil moisture in fields protected by a seven-row strip, and reserve of moisture in fields during Oct., March and the summer season. The relationship between wheat yield and soil moisture in fields within forest strips is analyzed and data are given on the effect of ten-row forest strips on yield of winter wheat and the effect of forest strips on soil moisture, effective utilization of productive moisture reserve and yield. *Subject Headings:* **1. Forest strip effects 2. Soil moisture retention 3. Wheat yield 4. Northern Caucasus, U.S.S.R.**—*I.L.D.*

## SYNOPTIC CLIMATOLOGY

7.3–275 551.589:551.513.2

Friedman, Don G., **Specification of temperature and precipitation in terms of circulation patterns.** *Journal of Meteorology*, 12(5):428–435, Oct. 1955. 5 figs., 5 tables, 16 refs., 5 eqs. DWB—The development of climatic classification by synoptic pressure patterns is summarized. Circulation patterns over N. America were approximated by 6 orthogonal polynomials for E–W, 4 N–S and 4 cross-product functions, for 700 mb heights and for sea-level pressures, obtained by high-speed computer. Daily temperature and precipitation are then related to these patterns. It is found that the local sea-level circulation accounts for 35% of variance of temperature and 28% of rainfall, broader scale sea-level pattern 55% temperature, 47% precipitation, and 700 mb pattern 46% temperature and 50% precipitation. Combination of the two levels explained 70% of variance. *Subject Headings:* **1. Dynamic climatology 2. Circulation patterns.**—*C.E.P.B.*

# MISCELLANEOUS

## COSMIC INFLUENCES

*See also:* **Atmos. & cosmic phenomena** (Piccardi), 7.3–267.

7.3–276 551.590.2

Piccardi, Giorgio (*Univ. of Florence*), **A proposito di una relazione fra fenomeni ambientali e fenomeni chimico-fisici: effetto della schermatura dello spazio.** [Relation of atmospheric phenomena and chemico-physical phenomena; the effect of space.] *Geofisica e Meteorologia*, Genoa, 2(1):18–19, Jan./Feb. 1953. fig. Also his: **Ancora su di una relazione fra fenomeni abientali e fenomeni chimico-fisici e sull'effetto della schermatura della spazio.** [More on relation between ambient phenomena and physical chemical processes, and on the effect of an enclosed space.] *Ibid.*, 1(2/3):42–44, March/June 1953. 3 figs., 2 tables. DWB—First article: the author noticed in 1939 that there seemed to be an increase or decrease in chemical reactions which depended on the weather but not on pressure, temperature or humidity. After the war he conducted 15,000 tests a year (1951 and 1952) to determine whether or not this was true. A marked seasonal effect (min. in winter, max. in summer for the closed space and the opposite for the open) showed up in the curves for the 2 years, based on the rate of precipitation of $BiCl_3$. Similar tests were made with identical results, in Brussels, by C. C. Boute and tests have been started (Feb. 1953) in Vienna by H. Y. Doat. One series of experiments was conducted in a closed or shielded (electrically) space and one in a free or nonshielded room. Second article: Continuing the experiments reported by the author in the previous paper, observation made during Feb. and March 1953 at Brussels, Vienna and Florence with shields made of aluminium, iron and copper, to show which metal has the greatest shielding effect are reported. The general tendency for precipitation of $BiCl_3$ to increase inside the electrostatic shielded enclosure during conditions when the process decreases outside the enclosure and vice versa, was noted during 1952 and 1953 the same as in 1951 and early 1952. Also: Piccardi, Giorgio and Fritsch, Volker (*Vienna*), **Fenomeni geo-cosmici e fenomeni chimico-fisici: effetto fell'altitudine.** [Geo-cosmic and chemical-physical phe-

nomena: effect of altitude.] *Ibid.*, 2(3/4):57–58, May/Aug. **1954.** fig., 3 refs. **DWB**—The results of the experiment on the precipitation of BiOCl as a result of cosmic influences, made at Mooserboden (2000 msl) which is 10 km from Kaprum in the High Taurus are repeated and compared with data obtained at Vienna-Unter-Tallnerbach (280 msl). The annual variation of precipitation is similar in these stations. Precipitation within copper chamber does not seem to be influenced by altitude. *Subject Headings:* **1. Cosmic influences on precipitation of chemicals 2. Physico-chemical relationships 3. Metal shielding effects.**—*I.L.D.*

7.3–277 551.590.2

Piccardi, Giorgio (*Univ. di Firenze*), **Sopra un test inorganico per lo studio degli influssi atmosferici e cosmici.** [Inorganic test for the study of atmospheric and cosmic influences.] *Geofisica e Meteorologia*, Genoa, 3(1/2):31–36, Jan./April **1955.** 4 figs. **DWB**—Comparative curves show mean monthly values of % precipitation of BiOCl (T) in a shielded with brass (*D*) and an unshielded (*F*) enclosure, for 1951–1955, based on 60,612 routine measurements (30,305 unshielded and 30,307 shielded) made at Florence. The secular, monthly, short period, and shielded-unshielded variations are described and explained. In each year there is a sharp Feb. min. in *D* explained on the basis of the proximity of the sun. The values of *F* (unshielded) show a lag of 5 days in the min. and max. values and over 5 days before geomagnetic storms. Difference between copper, aluminum and iron shielding is shown graphically: outside 46.4, iron 45.4, aluminium 42.2, brass 36.9; or the greater the conductability the greater the shielding. Aeration and circulation showed no effects. *Subject Headings:* **1. Ionization effects 2. Physico-chemical relationships 3. Solar influences on precipitation of chemicals.**—*M.R.*

7.3–278 551.590.21:551.524.33

Takahashi, K. and Asakura, T. (*Met. Res. Inst., Tokyo*), **Relation of the sun and the weather.** *Meteorological Society of Japan, Journal*, Ser. 2, 32(9/10):290–302, Sept./Oct. **1954.** 9 figs., 2 tables, 17 eqs., 9 refs. In Japanese; English summary p. 290. **DWB**—The 5-month periodicities in sunspot numbers, temperature (Obdorsk and Manila) and pressure over 30–50 yrs are analyzed harmonically and their amplitudes found to vary together. The phase angles of the temperature variation are in phase with sunspots in the Siberian and N. American anticyclones and in opposition in the subtropical belt. The distribution of amplitudes and centers of oscillation are also plotted. The 2.5 month oscillation of temperature is similar but less pronounced. The 5-month temperature periodicity is attributed to changes in the austausch coefficient in the atmosphere, not to the solar constant. *Subject Headings:* **1. Solar terrestrial relationships 2. Temperature periodicities.**—*C.E.P.B.*

7.3–279 551.543.1:551.590.22

Sawada, R. (*Central Met. Obs., Tokyo*) and Haurwitz, B. (*N. Y. Univ., Met. and Oceanography Dept.*), **The lunar air tide.** *Annales de Géophysique*, Paris, 11(2):145–147, April/June **1955.** table, 6 refs., eq. **DLC**—An analysis of semidiurnal pressure variations for 20 vertical temperature profiles is presented and discussed in respect to wind and seasonal changes both from a theoretical and empirical standpoint. *Subject Headings:* **1. Lunar atmospheric tides 2. Semidiurnal pressure variations.**—*M.R.*

## VISIBILITY

7.3–280 551.591.1:535.

Garbell, Maurice A., **Visual range in daylight, darkness, and twilight.** *Garbell Research Foundation, San Francisco, Garbell Aeronautical Series*, No. 6, **1952.** 38 p. 12+figs., 22 refs. **DLC**—Offers a detailed treatise on the meteorological visual range in which the reasons for the critical reduction of the slant visual range during period of twilight and in the presence of dazzle are fully analyzed. The study provides formulas, references, and charts necessary for the calculation of visual range in daylight, darkness, and twilight, for any given combination of optical extinction coefficients and brightness conditions, and recommends a brief, simple, and practical method for providing pilots with representative reports on the actual

final-approach weather prevailing along the instrument approach path. *Subject Headings:* **1. Visual range 2. Visibility.**—*Author's abstract.*

7.3–281 551.591.1

Lange, O., **Zur Bestimmung des Linkeschen Trübungsfaktors.** [On the determination of Linke's turbidity factor.] *Zeitschrift für Meteorologie*, 9(8):234–240, Aug. **1955.** 2 figs., 8 tables, 16 refs., 4 eqs. **DLC**—For the magnitudes of the formula $T_G = P_G[(\log I_0 - \log I) + (-\log R^2)]$ tables are given for determination of the turbidity factor, taking account of sun's height and pressure. While the calculation of values of $\log I_0 - \log I$ and $-\log R^2$ [$R$ = solar distance] is very simple, an analytical-graphical method had to be used for $P_G$ [a function of air mass]. With the aid of an approximation, using the Feussner-Dubois values, an equation is found by which $P_G$ can be approximately determined. The exact value is obtained by applying corrections found graphically. *Subject Heading:* **1. Turbidity measurement techniques.**—*Transl. of author's abstract.*

7.3–282 551.591.2:656.71

Sperry Gyroscope Company, Inc., **Flight investigation of the performance of low ceiling/visibility meteorological equipment. Summary report prepared for the Air Navigation Development Board. Appendix prepared by U. S. Weather Bureau.** Contract CCA 29773, Report No. 5245-4060, Oct. **1954.** 41 p. 9 figs. (fold.), tables, 4 refs. **DWB**—Flight tests were conducted in 1953 at MacArthur Airport and in early 1954 at the Idlewild Airport (New York International) to determine the effectiveness of the ceilometer-transmissometer system of measuring low ceiling and visibility in terms of what the pilot sees when landing on instruments. A total of 468 approaches, most of which were under <500 ft ceiling and 1 mi visibility, are analyzed. Answers are given by scatter diagrams and nomograms which can be used by a pilot to determine what he can see when given values of ceiling and visibility are received as based on transmissometer ceilometer readings at the ground. Fog and snow are taken into consideration. Vertical contact height, threshold contact height, runway visual range and approach light contact height are the elements the pilot can deduce from these charts. *Subject Headings:* **1. Ceiling and visibility measurement 2. Airport landing conditions 3. Ceilometer-transmissometer reports 4. Idlewild Airport, New York.**—*M.R.*

## OPTICAL PHENOMENA

*See also:* **Atmos. extinction** (Deirmendjian), 7.3–131; **Vertical ozone distrib.** (Walton), 7.3–148; **UV radiation distrib.** (Sekihara), 7.3–178.

7.3–283 551.593.1:535.32

Simonsen, Ove (*Institut Geodesique, Copenhagen*), **Effets de la réfraction atmosphérique sur les nivellements observés par un procédé optique.** [Effect of atmospheric refraction on leveling observed by optical procedure.] (In: I.U.G.G. Brussels, Aug. 1951, **Comptes rendus des Travaux de la Section des Nivellements de Précision.** pub. Paris, **1955,** p. 432–434.) **DWB**—The accuracy of methods used by Kukkamäki in Finland for determining index of refraction during leveling have been tested in Denmark. The system, invented by A. Hermansen, makes use of a double periscope with two pentagonal prisms 1.6 m apart in a vertical plane, so that if the image of a light source is seen to coincide with the other image, no refraction is present. On occasion a systematic variation of atmospheric refraction of 2.5 mm was observed over 50 m around noon. Variations as high as 0.5 mm in 15 to 20 min have been observed many times. *Subject Headings:* **1. Atmospheric refraction instruments 2. Refractive index 3. Denmark. I. Hermansen, A.**—*M.R.*

7.3–284 551.593.12:522(08)

**Cambridge astronomical symposium.** *Nature*, London, 176(4488):864–865, Nov. 5, **1955. DWB**—Symposium on "Astronomical seeing," Sept. 12–14, **1955.** J. S. Hall described correlation between intensity scintillation of lamps attached to balloons, and upper winds. P. B. Felligett reviewed theory of scintillation. A. Hewish gave quantitative

results at Cavendish Laboratory; G. KELLER described work at Perkins Observatory; and A. HYNEK, astronomical studies at Flagstaff (Arizona) and Ohio. B. H. BRIGGS described radio observations. *Subject Headings:* **1. Scintillation 2. Astronomic meteorology 3. Symposia.**—*C.E.P.B.*

7.3–285 551.593.5

Shifrin, K. C., **Amplitudy partsial'nykh voln pri rasseianii sveta oblachnoĭ kapleĭ.** [Amplitudes of partial waves in the scattering of light of a cloud drop.] *Akademiia Nauk SSSR, Izvestiia, Seriia Geofizicheskaia*, 4:375–377, **1954.** table, 2 refs. **DLC**—The author presents a table containing the amplitudes of partial waves obtained in the diffraction of light by cloud droplets ($\rho = 2\pi\alpha/\lambda = 60$, $\alpha$ = radius of the drop, $\lambda$ = wave length, $m = 1.3300$—index of reaction). *Subject Headings:* **1. Scattering of light 2. Diffraction by clouds.**—*I.L.D.*

7.3–286 551.593.54:551.515

Neuwirth, R., **Trübungsquotient und atmosphärische Dynamik.** [Quotient of turbidity and atmospheric dynamics.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 6(4):431–442, **1955.** 7 figs., table, 11 refs. German, English and French summaries p. 431–432. **DWB**—Actinometer measurements at Baden-Baden and Freiburg gave the ratio of the turbidity factors for red- and short-wave radiation (*TQ*) for different air masses, times of day and weather types. *TQ* increased with increasing lability, which in most cases was due to neighborhood of a frontal zone. The warm side of the jet stream gave especially high *TQ*. Some applications to forecasting precipitation in a SW weather type are given. *Subject Headings:* **1. Turbidity factor 2. Frontal passage effects.**—*C.E.P.B.*

7.3–287 551.593.63

Sandner, Werner, **Häufigkeit und Formen zusammengesetzter Halo-Erscheinungen** [Frequency and form of compound halo phenomena.] *Zeitschrift für Meteorologie*, Berlin, 9(3):88–91, March **1955.** 4 tables, 6 refs. **DWB, DLC**—The author summarizes halo observations observed personally over a period of 26 yrs. Data are presented on frequency of compound halos (lunar and solar) and on the various types of compound halos. *Subject Headings:* **1. Halo frequencies 2. Compound halos.**—*I.L.D.*

7.3–288 551.593.63(43)

Spangenberg, W. W. (*Schwerin, Meckl.*), **Ergebnisse von Halobeobachtungen in Schwerin (1929–1952).** [Results of halo observations in Schwerin (1929–1952).] *Zeitschrift für Meteorologie*, Berlin, 8(11/12):369–373, Nov./Dec. **1954.** 2 figs., 5 tables, 8 refs. **DWB**—The halo observations were made at fixed intervals four times a day and they were made with the naked eye. Data are presented giving the mean monthly number of days with solar and lunar halos, annual variation of halo frequencies, intensity of halos, the dependence of lunar halos upon lunar phase, the relationship between halo frequency and cloudiness and cirrus days with solar halos. *Subject Headings:* **1. Halo observations 2. Halo frequencies 3. Schwerin, Germany.**—*I.L.D.*

## ELECTRICAL PHENOMENA

*See also:* **Radio observatories** (Smith-Rose), 7.3–34; **Atmos. electricity investigations** (Reiter), 7.3–256.

7.3–289 551.594.1

Reiter, Reinhold, **Einflüsse meteorologischer Feinvorgänge auf das Verhalten luftelektrischer Grössen in verschiedenen Höhenstufen. I Teil.** [Influence of micrometeorological processes on atmospheric electric magnitudes in different height stages, Pt. 1.] *Meteorologische Rundschau*, 8(7/8):127–133, July/Aug. **1955.** 5 figs., 2 tables, 7 eqs. **DLC**—Synoptic-electrical observations (at least 3 points) were classified according to general meteorological and electrical types and according to the local winds, inversions, cloud type, precipitation charge, fronts and fohn phenomena. The discussion is introduced by theoretical remarks on conduction in "unrarefied" gases and space charge distribution in certain model

ses. Analysis of observations at 8 stations in the E. Alps ranging from a valley at 675 m Zugspitze summit (2963 m) will follow in Pt. 2 (*see* 7.3–290). *Subject Headings:* **1. Atmospheric electricity 2. Bavarian Alps.**—*C.E.P.B.*

7.3–290 551.594.1

Reiter, Reinhold, **Einflüsse meteorologischer Feinvorgänge auf das Verhalten luftelektrischer Grössen in verschiedenen Höhenstufen. 2 Teil.** [Influence of micrometeorological processes on atmospheric electric magnitudes in different height stages, Pt. 2.] *Meteorologische Rundschau*, 8(9/10):148–165, Sept./Oct. **1955.** 23 figs., 2 tables, 21 refs. **DWB**—Pt. 2 sets out autographic records of potential gradient, vertical current and conductivity during day valley and night downslope wind, surface inversion, subsidence inversion, rising inversion boundary, high-reaching convection and disturbed weather, at Garmisch and a number of other stations at different heights. Each case is analyzed in detail. (For Pt. 1, *see* 7.3–289, March 1956, *MAB.*) *Subject Headings:* **1. Atmospheric electricity 2. Bavarian Alps.**—*C.E.P.B.*

7.3–291 551.594.25

Gunn, Ross, **Droplet-electrification processes and coagulation in stable and unstable clouds.** *Journal of Meteorology*, 12(6):511–518, Dec. **1955.** 3 figs., 13 refs., 23 eqs. **DWB**—Atmospheric ions formed by cosmic rays or other means normally diffuse onto cloud droplets and electrify them. A nearly Gaussian distribution is established in which about half of the droplets in any selected volume of a stable cloud acquire a positive charge that is typically eleven electronic units, while the other half is negative. More than 95 per cent of the droplets of a typical cloud are electrified. When droplet association is negligible, an equipartition is established between the thermal kinetic energy of the droplets and their electrical potential energy. In an unstable cloud, these electrified droplets mechanically associate by relative motion in the gravitational field. Thus, the growing droplets accumulate charge and a statistical distribution of highly charged droplets is established. Expressions are derived for the distribution and for the mean statistical charge on the associated droplets. Equal numbers of positive and negative droplets are normally produced, but systematic charging due to unequal ionic conductivities sometimes results in marked electrification of a single sign. The influence of droplet electrification upon cloud stability is considered. The droplet charges normally have a detectable, but not important, direct effect upon the coagulation rate of the cloud. The indirect effects, however, may be large. Electric fields of appreciable magnitude always accompany precipitation as a result of drop-charge separation. Expressions are derived for the electrical coagulation of clouds immersed in an electrical field. It is shown that electrical coagulation may exceed that due to gravitation whenever the environmental electric field is 2 statvolts per centimeter or larger. Since fields this large are commonly observed in thunderstorms, the resulting precipitation rates are correspondingly large. *Subject Heading:* **1. Electrical charges on raindrops.**—*From author's abstract.*

7.3–292 551.594.25

Gunn, Ross, **Raindrop electrification by the association of randomly charged cloud droplets.** *Journal of Meteorology*, 12(6):562–568, Dec. **1955.** 2 figs., table, 11 refs., 18 eqs. **DWB**—Growing raindrops or graupel falling through an unstable cloud (*see* 7.3–291) are bombarded by both positive and negative droplets. The distribution of the number of drops in relation to the sign and magnitude of the free charge is worked out from basic principles and shown to agree remarkably well with the magnitude and distribution of drop charges measured inside precipitating clouds. The mean drop charge, *irrespective of sign*, depends on the square root of the drop size and kinetic energy of the small droplets *relative* to the larger moving drops. The estimated drop charges on warm rain or graupel are sufficiently large to account for thunderstorm phenomena, provided some process systematically separates positively and negatively charged drops. The charges at the rain forming level are about 50 e.s.u. per gm. The observed electrification of quietly falling rain is mainly due to ionization by radioactivity and cosmic rays. *Subject Heading:* **1. Electrical charges on raindrops.**—*From author's abstract.*

## AURORAS

7.3–293 551.594.51

Omholt, A. and Harang, L., **Measurements of the mean lifetime of the metastable *S*-state of the oxygen atom in the upper atmosphere during auroral displays.** *Journal of Atmospheric and Terrestrial Physics,* 7(4/5):247–253, Oct. **1955.** 3 figs., table, 6 refs., 9 eqs. **DWB**—The intensity variations of the green oxygen line 5577Å ( $D-S$) and the first negative nitrogen band 4278Å ($N_2+$, $B^2\Sigma_u+-X^2\Sigma_g+$) are measured in rapidly changing auroras. The mean lifetime of the upper state of the nitrogen band is of the order $10^{-8}$ sec, the intensity variation of this band will probably therefore at the same time represent the instantaneous relative excitation rate of the metastable OI '*S*-level. The mean lifetime of the metastable OI '*S*-level is theoretically calculated to be of the order $\tau=0.75$ sec (GARSTANG, 1951). One should therefore expect a time-lag in the intensity curve of the 5577-line relative to the 4278-band. This effect is demonstrated on the records, and the mean lifetime of the OI '*S*-level is found to vary between 0.45 and 0.75 sec. The upper value (0.75 sec) confirms the theoretical value found by GARSTANG (1951), the lower value found indicates that a probability of collisional deactivation of the metastable OI '*S*-level of the order 1 $sec^{-1}$ may appear in the auroral region of the upper atmosphere. *Subject Heading:* **1. Auroral physics.**—*Authors' abstract.*

7.3–294 551.594.51

Petrie, W. (*Radio Physics Lab., Defense Res. Board, Ottawa*), **Rotational temperature of auroral nitrogen bands.** *Journal of Atmospheric and Terrestrial Physics,* London, 4(1/2):5–9, **1953.** 4 figs., 11 refs., 11 eqs. **DWB**—Auroral spectrograms of dispersion 42-28 A/mm have been analyzed with a recording microphotometer. Rotational temperatures were determined from the profiles of VEGARD-KAPLAN and Negative Group nitrogen bands, and found to be in the range 450–750°K. It now appears that spectroscopic, rocket and radio results are in reasonable agreement. *Subject Headings:* **1. Rotational temperatures 2. Auroral zone temperatures 3. Auroral nitrogen bands.**—*Author's abstract.*

7.3–295 551.594.6:621.396.8

Chandrashekhar Aiya, S. V. and Phadke, K. R., **Atmospheric noise interference to broadcasting in the 3-Mc/s band at Poona.** *Journal of Atmospheric and Terrestrial Physics,* 7(4/5):254–277, Oct. **1955.** 2 figs., 11 tables, 19 refs., 7 eqs. **DWB**—Measurements of atmospheric noise on 2.9 Mc/s were made at Poona in 1953 between 18–23 h IST. The instrumental set-up is described, measurements tabulated, assessed and compared with previous estimates at Washington and London. Probable sources of noise in Poona are lightning in the Malayan and Javan region, Bay of Bengal and land mass of India. The noise levels from each of these are assessed from thunderstorm data and compared with observed values. *Subject Headings:* **1. Radio noise 2. Lightning radiation 3. Poona, India.**—*C.E.P.B.*

7.3–296 551.594.6

Chandrashekhar Aiya, S. V., **Noise power radiated by tropical thunderstorm.** *Institute of Radio Engineers, N. Y., Proceedings,* 43(8):966–974, Aug. **1955.** fig., table, 23 refs., 21 eqs. **DLC**—The common types of tropical thunderstorms are described. A synthesis is made of the available information on the subject. Hence, the essential peculiarities and electrical parameters of typical lightning discharges are deduced. These are utilized to explain the radiation that appears as radio noise. An expression is deduced for the average electric field due to a stroke in a flash. This is used to evaluate the power at the source that should correspond to the noise field strength as measured by the noise meter previously described by the author. The noise power is found to vary as the inverse square of the frequency and the expression obtained for the noise power is expected to be valid in the frequency range of 1–20 mc. The theoretical results are compared with values obtained by experiment. There is close agreement between the two. *Subject Headings:* **1. Thunderstorm electricity 2. Radio noise 3. Tropical thunderstorms.**—*Author's abstract.*

7.3–297 551.594.7:551.510.52:621.396.029

Bean, Bradford R. and Meaney, Frances M. (*both, National Bureau of Standards, Boulder, Colorado*), **The monthly refractivity gradient for the United States and its application to predicting the geographical and annual trend of VHF transmission loss.** (In: Conference on Radio Meteorology, Nov. 9-12, 1953, Univ. of Texas, **Supplement to the Proceedings,** III-2, pub. **1954.** 11 p. 5 figs., table, 4 refs., 2 eqs.) **DWB**—Climatological studies of VHF propagation conditions all over the U. S. are under way, using the simple parameter $\Delta N$ (refractivity gradient from surface to $k$ km above the surface) to correlate with the transmission loss over the propagation path whose midpoint is over the weather station in question. Other causes must be taken into account (roughness, distance, height of antenna, etc.). The present method reduces the month-to-month and station-to-station uncertainty by taking out the average climatic effect. Tables and curves based on 1950–52 data show effectiveness of method and amount of variation. *Subject Headings:* **1. Tropospheric propagation 2. Refractivity gradient climatology 3. U.S.A.**—*M.R.*

## RADIO METEOROLOGY

7.3–298 551.594.7

Booker, H. G., **On the level at which fading is imposed on waves reflected vertically from the ionosphere.** *Journal of Atmospheric and Terrestrial Physics,* 7(6):343–344, Dec. **1955.** 4 refs. **DWB**—The observed width of the autocorrelation function at lower frequencies is 6–7 times that given by theory. Hence the level of the ionospheric irregularities causing fading is where the local wave length is 6–7 times $\lambda_0$. *Subject Heading:* **1. Radio fading.**—*C.E.P.B.*

7.3–299 551.594.7

Fejer, J. A., **The interaction of pulsed radio waves in the ionosphere.** *Journal of Atmospheric and Terrestrial Physics,* 7(6):322–332, Dec. **1955.** 4 figs., 13 refs., 19 eqs. **DWB**—It has been established that radio-wave interaction between pulsed radio waves with frequencies of the order of 2 Mc/s takes place above the Transvaal during the day at heights of about 70–90 km. The use of this effect appears to be a promising method of exploring the lowest regions of the ionosphere. The results of the present observations support, for the case of small excess electron energies, the original form of the BAILEY-MARTYN (1934, 1935) theory of radio-wave interaction rather than the modification suggested by HUXLEY (1953). The results for the collision frequency appear to be in agreement with results derived from laboratory measurements by CROMPTON, HUXLEY and SUTTON (1953), and also with the collision frequency at the height of 65 km obtained from observations of partial reflections by GARDNER and PAWSEY (1953). The present results from the electron density do not differ greatly from the results of GARDNER and PAWSEY (1953). *Subject Heading:* **1. Radio wave interaction.**—*Author's abstract.*

## ACOUSTICAL PHENOMENA

7.3–300 551.596:534.321.9

Richardson, E. G., **Recent developments in ultrasonics.** *Science Progress,* London, 43(172):606–615, Oct. **1955.** 8 figs., 7 refs. **DLC, DWB**—An account of academic researches. In gases, trains of waves are investigated with an ultrasonic interferometer. The difference of behavior of shock waves in air and carbon dioxide is shown. Liquids and solids are also considered. *Subject Heading:* **1. Ultrasonics.**—*C.E.P.B.*

7.3–301 551.596.1:551.524.7:551.557

Crary, A. P. and Bushnell, Vivian C., **Determination of high-altitude winds and temperatures in the Rocky Mountain area by acoustic soundings, October 1951.** *Journal of Meteorology,* 12(5):463–471, Oct. **1955.** 6 figs., 4 tables, 8 refs. **DWB**—On each of 10 tests 3 4000-lb bombs were dropped 35 km apart by aircraft and recordings made at 4 listening posts. The winds and temperatures were calculated up to 50 km. At the temperature reversal near 50 km (−55°C at 30 km, 3–6°C at 45 km) light variable winds were found. Above 50 km

wind and temperature effects could not be separated but an assumed temperature curve gav westerly winds up to 100 m/s at 70–80 km with shears up to 10 m/sec/km. *Subject Heading* **1. Upper air temperatures 2. Upper air winds 3. Acoustical sounding 4. Rocky Mountains** —*C.E.P.B.*

7.3–302 551.596.

Skeib, Gunter, **Über die Schallausbreitung bei atmosphärischer Turbulenz.** [On th propagation of sound in atmospheric turbulence.] *Zeitschrift für Meteorologie*, 9(8):225–23 Aug. **1955.** 10 figs., table, 11 refs., 8 eqs. **DLC**—Measurements of the scatter of soun waves of 100 Hz to 4 *k*Hz from a loud-speaker were made at Lindenberg, with micrometeoro logical observations for comparison. Absorption and scattering are discussed theoreticall and the instrumental set-up described. At a height of 30 m and distance 150 m, with win >5 m/s damping was 13 db, increasing with frequency, and decreasing to half at 3 m/s. A 5 m height and 50 m distance results were similar but the wind effect less. *Subject Heading* **1. Acoustical propagation.**—*C.E.P.B.*

# PART II. ANNOTATED BIBLIOGRAPHY ON COSMIC RAYS IN THE ATMOSPHERE (–1952)

By: *Mary L. Rice and Geza Thuronyi*

## INTRODUCTION

This bibliography is essentially a collection of some of the literature on meteorological aspects of cosmic radiation accumulated during the past five years. Because of the vast volume of cosmic ray literature (amounting to some 5 or 10 thousand articles at present) it is not possible to publish either a complete or a critically selective sample of international literature in this field. Publication of a more or less representative cross section through the rich crop of contributions, including works of major importance as well as more specialized reports has therefore been the only alternative.

We have tried to emphasize the literature on the modification of cosmic radiation during its passage through the atmosphere, including papers on: comparison of cosmic ray measurements made at various altitudes (with particular attention to high-altitude measurements obtained at mountain observatories and with balloons or rockets), atmospheric pressure and temperature effects on cosmic ray intensity, cosmic ray showers in the atmosphere, etc.; and not neglecting a considerable number of papers dealing with other problems of cosmic radiation, such as: geomagnetic influences on cosmic rays, biological effects of cosmic radiation, physical properties of the various cosmic ray components, the origin of cosmic rays, instrumentation, equipment, etc. A subject outline which follows, gives a perspective of the various aspects covered.

In addition to the literature of the last ten years, we have included some articles of historic interest (even some pre-dating the actual discovery of cosmic rays as such) which mark interesting phases in the development of cosmic ray research. Furthermore, to facilitate location of additional material a number of items refer to periodicals in which references to cosmic ray literature regularly appear (*see items* 7C–1 to 7C–6).

A few abstracts relating to cosmic radiation, previously published in *MAB*, have not been found to be of sufficient interest, from the point of view of this bibliography, to warrant repetition (for example, *items* 2.11–190, 3.6–103, 3.7–120, 3.10–157, 4H–162, 4.10–3, 5.1–296 and 5.6–138, *MAB*).

Owing to space limitations this bibliography was divided into two parts. The first part, included in this issue, covers the literature up to 1952; the second part, to appear in the April issue, continues from 1953 to date.

Acknowledgment is due to Mrs. K. Martinoff and Mr. W. Nupen for collecting a large portion of the material for these bibliographies.

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## GEOGRAPHICAL OUTLINE

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**7C–1** 551.521.64(05):019.941

†France. Centre National de la Recherche Scientifique, **Bulletin Signalétique, Pt. 1,** v. 1, **1949–.** Latest issue seen, v. 17, No. 1, **1956.** Monthly. Title varies: **Bulletin Analytique,** V. 1–16, 1940–1955. Editor, 1956, Mrs. Duval. Edited at the Centre de Documentation du C.N.R.S., Paris. **DLC**—This is one of the major bibliographic sources of world literature on cosmic radiation. In each issue under the heading **Physique corpusculaire** there is a section entitled **Rayons cosmiques** (easily located through the table of contents) which usually contains around 50 or 60 briefly annotated citations. (For fuller information, *see* 4.5–19, May 1953, *MAB.*) *Subject Headings:* **1. Cosmic ray abstracts 2. Cosmic ray bibliographies 3. Abstracting periodicals.**—*G.T.*

**7C–2** 551.5(05):016

†**Journal of Geophysical Research,** Wash., D. C., v. 1, **1896–.** Latest issue seen, 60(4), Dec. **1955.** Quarterly. Title was **Terrestrial Magnetism and Atmospheric Electricity** through v. 53, 1948. **DLC**—At the end of each issue there is a **List of recent publications,** with a section on cosmic rays (up to 1948 on terrestrial and cosmical electricity) giving a varying number (from less than 10 to 50 or more) of references to current cosmic ray literature. (For fuller information, *see* 6A–44, Jan. 1955, *MAB.*) *Subject Headings:* **1. Bibliographies 2. Cosmic ray bibliographies.** —*G.T.*

**7C–3** 551.521.64:016(05)

†Mexico City. Centro de Documentación Científica y Técnica, **Boletín,** v. 1, No. 1, Jan. 1952–. Latest issue seen, 4(12), Dec. **1955.** Monthly. Editor, Dr. F. Priego. Price: $6.00 per vol. **DPU**—References in this bibliographic journal are given with complete citation of author, title and source, without annotation. Entries on cosmic rays (about half a dozen each month) will be found in Sec. D5 (**Radiacion cosmica**). (For fuller abstract, *see* 5.5–10, May 1954, *MAB.*) *Subject Headings:* **1. Bibliographies 2. Cosmic ray bibliographies.**—*G.T.*

**7C–4** 55(05)(048.8)

†**Physics Abstracts,** London, v. 1, **1898–.** Latest issue seen, 58(696), Dec. **1955.** Edited and issued by the Institution of Electrical Engineers in association with the Physical Society of London, The American Physical Society and the American Institute of Electrical Engineers. Monthly. Title varies. **DLC**—This abstracting journal provides one of the most extensive coverages of the cosmic ray world literature. Each monthly issue contains several dozen abstracts of current papers on cosmic radiation. The abstracts are grouped according to the universal decimal classification system and those on cosmic rays will consequently be found under the classification 537.591. Another approach is available from the annual and cumulative indexes in which the particular subject matter of each paper is brought to attention. (For fuller information, *see* 6A–30, Jan. 1955, *MAB.*) *Subject Headings:* **1. Cosmic ray abstracts 2. Cosmic ray bibliographies 3. Abstracting periodicals.** —*G.T.*

**7C–5** 55(05)(048.8)

†**Referativnyĭ Zhurnal. Fizika,** No. 1, Jan. **1954–.** Latest issue seen, No. 12, Dec. **1955.** Monthly. Issued by Akademiia Nauk, SSSR. Institut Nauchnoĭ Informatsii, Moscow. Editor, E. V. Shpolskii. **DLC**—Each monthly issue contains about two dozen or more references to current international literature on cosmic radiation. Detailed abstracts are included. The section under

which cosmic ray material will be found is entitled **Kosmicheskie luchi** under the general heading **Iadernaia fizika** (see table of contents inside front cover). A few references to papers on the *origin* of cosmic rays also appear in the **Astronomical** section of **Referativnyĭ Zhurnal.** (For fuller abstract, *see* 6A–31, Jan. 1955, *MAB.*) *Subject Headings:* **1. Cosmic ray abstracts 2. Cosmic ray bibliographies 3. Abstracting periodicals.**—*G.T.*

**7C–6** 539.17(05):019.941

†U. S. Atomic Energy Commission, **Nuclear Science Abstracts,** v. 1, July 15, 1948–. Latest issue seen 10(3), Feb. 15, **1956.** Semi-monthly. Issued by the Technical Information Service, Oak Ridge, Tenn. Editor, Everett J. Hoffman. Price: $6.00 yearly from U. S. GPO, Wash. 25, D. C. **DLC**—In each issue several abstracts of papers on cosmic rays will be found in a section on **Physics** under the sub-heading **Cosmic radiation,** at the rate of some 200 to 250 a year. In the quarterly and annual indexes (and the cumulated index to vols. 1–4, issued as 4(24B), Dec. 30, 1950) detailed entries (starting with the word "cosmic") lead back to the subjects covered in the abstracts. (For fuller information, *see* 6B–58, Feb. 1955, *MAB.*) *Subject Headings:* **1. Cosmic ray abstracts 2. Cosmic ray bibliographies 3. Abstracting periodicals.**—*G.T.*

## 1850

**7C–7** 537.56

Matteucci, Ch., **Mémoire sur la propagation de l'électricité dans les corps isolants, solides et gazeux.** [Treatise on the propagation of electricity in solid and gaseous insulating substances.] *Annales de Chimie et de Physique*, Paris, 3rd Ser., 28:385–429, **1850.** 3 figs., tables. **DLC**—In a series of experiments diffusion of electricity was measured in purified air and other gases under a bell jar. The experiments are described in detail. The study reveals that the rate of loss of electric potential in purified gases does not follow Coulomb's law stating that electric diffusion is directly proportional to initial voltage (in the case of conductive air). According to the author's measurements, the electric leakage in pure gases is independent of initial voltage, sign of the charge, and chemical composition of the gas. It varies with temperature and density of the gas. *Subject Headings:* **1. Ionizing rays 2. Ionization effects.**—*G.T.*

## 1900

**7C–8** 537.56

Geitel, Hans, **Über die Elektrizitätszerstreuung in abgeschlossenen Luftmengen.** [Diffusion of electricity in enclosed air.] *Physikalische Zeitschrift*, Leipzig, 2(8):116–119, Nov. 24, **1900.** figs., table, refs. **DLC**—An apparatus for measuring electric charges in completely enclosed air is described and illustrated. Measurements made in this chamber show a steady decrease in voltage, independent of initial charge, of its sign, or of illumination. The phenomenon is attributed to the production of ions (depending on temperature and pressure) having an opposite charge to the electric field in the chamber. These ions, according to author, are produced in a process of regeneration to restore the normal amount of ions originally present but destroyed by induction of the electric charge. *Subject Headings:* **1. Ionizing rays 2. Ionization effects.**—*G.T.*

**7C–9** 537.56

Wilson, C. T. R., **On the leakage of electricity through dust-free air.** *Cambridge Philosophical Society, Proceedings*, 11:32, **1900.** **DLC**—Reports measurements of electric potential in purified air in a vessel completely sheltered from any known ionizing agent. A constant regression in electric potential was observed, dependent on pressure and independent of initial voltage, sign of charge, location or illumination. It would appear "that 20 ions of either sign are produced per second in each c.c. of air at atmospheric pressure." *Subject Headings:* **1. Wilson cloud chamber 2. Ionizing rays.**—*G.T.*

## 1910

**7C–10** 537.59

Gockel, Albert, **Luftelektrische Beobachtungen bei einer Ballonfahrt.** [Observations of atmospheric electricity during a balloon flight.] *Physikalische Zeitschrift*, Leipzig, 11:280–282, **1910.** ref. Also his: **Messungen der durchdringenden Strahlung bei Ballonfahrten.** [Measurements of penetrating radiation during balloon flights.] Ibid., 12:595–597, **1911.** refs. **DLC**—Ionization-chamber measurements made during three balloon flights up to 2800 m did not produce the expected decrease of $\gamma$-radiation intensity. This result leads to the assumption that a considerable portion of the penetrating radiation is independent of the direct effect of active substances in the earth's crust. These results are in agreement with measurements made by T. Wulf on the Eiffel tower in Paris (*Phys. Zeit.*, 11:811–813, **1910**). (For similar findings, *see also* papers by Victor F. Hess, *Phys. Zeit.*, 12:998–1001, 1911 and 13:1084 1091, **1912**). *Subject Headings:* **1. Ionizing rays 2. Cosmic ray measurement 3. Paris, France. I. Wulf, T. II. Hess, Victor F.**—*G.T.*

1926

7C–11 551.521.64 551.594.11

Lautner, Peter, **Uber Erfahrungen bei luftelektrischen Messungen auf der Zugspitze.** [Atmospheric electricity measurements on the Zugspitze.] *Meteorologische Zeitschrift*, 43:488–489, 1926. Also: **Luftelektrische Studien auf der Zugspitze.** [Atmospheric electricity studies on the Zugspitze.] *Bavaria. Landeswetterwarte, Deutsches Meteorologisches Jahrbuch*, 48:D1-8, 1926. **DWB**—A summary of measurements of: 1) cosmic radiation; 2) potential gradient (with harmonic analysis of diurnal variation); 3) conductivity; 4) space charge. (*Same item as* 2K–74, Nov. 1951, *MAB.*) *Subject Headings:* **1. Cosmic radiation 2. Zugspitze, Germany.**

1930

7C–12 551.521.64

*Verigo, A. B., **Opredelenie koeffitsienta poglashcheniia kosmicheskikh lucheĭ atmosfernym vozdukhom po izmereniiam na El'bruse.** [Determination of the coefficient of absorption of cosmic rays by air according to measurements made on Mount Elbrus.] *Leningrad. Glavnaia Geofizicheskaia Observatoriia, Izvestiia*, No. 1:34–43, 1930. fig., 5 tables, refs., eq. English summary p. 43. **DLC**—Description of measurements on the intensity of cosmic rays made with KOHLHÖRSTER's electroscope at the summit and on the slopes of Elbrus, at altitudes of 5400, 4200 and 3300 m above sea level. Results presented in tables. *Subject Headings:* **1. Cosmic radiation 2. Mt. Elbrus, U.S.S.R.**—*C.K.*

1931

7C–13 551.521.64

*†Kohlhörster, W. and Tuwim, L., **Der Barometereffekt der Höhenstrahlung.** [Pressure effect in cosmic radiation.] *Ergebnisse der Kosmischen Physik*, 1:87–126, 1931. 23 figs., 7 tables, 37 refs., 6 eqs. Also their: **Absorptionskoeffizienten der Höhenstrahlung.** [Absorption coefficients of cosmic radiation.] *Ibid.*, p. 127–179. 20 figs., 34 tables, 119 refs., 83 eqs. **DLC**—In addition to detailed reviews of instrumentation and methods of measurement, these two extensive articles contain tabular and graphical data obtained by various authors on cosmic ray intensity as a function of atmospheric pressure, and on absorption of the hard and soft components of cosmic radiation in the atmosphere (including measurements from balloons), and in water, lead and gold. *Subject Headings:* **1. Pressure effects on cosmic rays 2. Cosmic ray penetration.**—*G.T.*

1932

7C–14 551.521.64

*Priebsch, Josef and Steinmaurer, R., **Ganzjährige Registrierbeobachtungen der kosmischen Ultrastrahlung auf dem Hohen Sonnblick (3106 m).** [Whole year recorded observations of cosmic radiation on the high Sonnblick (3106 m).] *Beiträge zur Geophysik*, 37:296–314, 1932. 7 figs., tables, 16 refs. **DWB.** Also in: *Akademie der Wissenschaften, Vienna, Math.-Naturwiss. Klasse, Anzeiger*, No. 13:11–113, 1932. **DLC**—Observations 1929–30 reduced to 520.5 mm pressure gave 8.00 and 6.13 J; correlations with pressure 0.6–0.9. (*Same item as* 2K–133, Nov. 1951, *MAB.*) *Subject Headings:* **1. Cosmic ray data 2. Sonnblick, Austria.**—*C.E.P.B.*

1933

7C–15 551.521.64

*Bowen, I. S.; Millikan, R. A. and Neher, H. V. (*Calif. Inst. of Tech.*), **New high-altitude study of cosmic-ray bands and a new determination of their total energy content.** *Physical Review*, Ser. 2, 44(4):246–252, Aug. 15, 1933. 4 figs., 3 tables, 12 refs. **DLC**—Recent balloon and airplane measurements in which cosmic ray information was extended to 29,000 ft at lat. 34°N and 22,000 ft near the equator are analyzed and compared with earlier measurements. By extrapolation above these altitudes "a complete cosmic ray intensity curve extending from the lowest depths to the top of the atmosphere" is plotted. The new data appear to confirm that more than 90% of the atmospheric ionization is due to the softest cosmic ray band having an absorption coefficient of 0.5–0.6 per m water, three to five times that of the nearest other cosmic ray band. Total energies of cosmic radiation falling upon the earth, and cosmic ray energies in the universe are also computed. *Subject Headings:* **1. Cosmic ray intensity 2. Cosmic ray spectrum.**—*G.T.*

1934

7C–16 551.521.64:551.506(485)

*†Corlin, Axel, **Cosmic ultra-radiation in Northern Sweden.** 113+80 p. 43 figs. (incl. photos), 6 tables, 388 refs., 29 eqs. Thesis (Ph.D.) Univ. of Lund, 1934. *Lund. Universitet Observatoriet, Annals*, No. 4, 1934. **DLC**—The entire field of cosmic radiation, its measurement, and relations

with other physical phenomena are reviewed with extensive references to world literature. Ch. 3 (p. A46–74) on meteorological influences on cosmic radiation contains a mathematical development of the multiple correlation method for determining the pressure, temperature and humidity effects. Data on pressure and cosmic ray intensity variations are presented for Abisko (1932–1933) showing variations in the barometer effect, and the presence of a secondary barometer effect. A yearly variation of radiation intensity is also found in these measurements. In other chapters various measurement techniques, effects of geomagnetic field variations, cosmic radiation absorption in water and the origin of cosmic rays are discussed. Data on cosmic ray intensity obtained by the author in northern Sweden (1929–1930 and 1932–1934) are tabulated along with geomagnetic data. *Subject Headings:* **1. Cosmic radiation 2. Pressure effects on cosmic rays 3. Cosmic ray data 4. Abisko, Sweden.**—*G.T.*

## 1935

**7C–17** 551.521.64

Millikan, Robert A., **Studies of cosmic rays.** *Carnegie Institution of Washington, Yearbook,* No. 34:343–345, **1935.** fig. Also: Millikan, Robert A. and Neher, H. Victor, **A precision world survey of sea-level cosmic-ray intensities.** *Physical Review,* N. Y., 50(1):15–24, July 1, **1936.** 14 figs., table, refs. **DLC**—The chart of lines of equal cosmic ray intensity at sea level reproduced in this Yearbook is the first of its kind for the whole earth. It shows the equatorial dip or deficiency of >12% (in SE Asia) to >8% (South America) and flat condition in Arctic, sub-Arctic and Antarctic. The same chart is published in **Physical Review** along with another world chart showing routes of 12 trips over main commercial routes of world and across continent, where author and colleagues measured cosmic ray intensity at sea level and aloft to 29,000 ft in airplanes. The sudden equatorial dip in various longitudes is described and data from several trips shown on graphs. Equipment is described and illustrated in detail. *Subject Headings:* **1. Cosmic ray charts of world 2. Equatorial dip in cosmic radiation 3. Cosmic ray intensity.**—*M.R.*

## 1937

**7C–18** 551.508.25:551.507.321.2

Johnson, Thomas H., **Radio-transmission of coincidence counter cosmic-ray measurements in the stratosphere.** *Franklin Institute, Philadelphia, Journal,* 223(3):339–354, March **1937.** 7 figs., refs., 5 eqs. **DLC**—Dealing with recent progress in cosmic ray measurement techniques, the author describes 350 g cellophane balloons designed to carry 4 kg of useful load to the 30 mm pressure level. Characteristics, performance and handling of the balloons are discussed and illustrated (p. 347–354). (*Same item as* 5E–82, May 1954, *MAB.*) *Subject Headings:* **1. Plastic balloons 2. Cosmic ray measurement 3. Stratospheric research.**—*G.T.*

**7C–19** 551.508.25:551.507.321.2

Keen, C. D., **High altitude test of radio-equipped cosmic ray meter.** *Franklin Institute, Philadelphia, Journal,* 223(3):355–373, March **1937.** 9 figs., refs. **DLC**—This account of a cosmic ray measurement flight includes description (p. 366–371) and illustration of balloons and their performance. Three 8-ft balloons made of slightly vulcanized rubber weighing 7–8 lbs and capable of expanding to 15 ft in diameter were tied together to carry a useful load of 41 lbs to a maximum height of 52,000 ft. (*Same item as* 5E–83, May 1954, *MAB.*) *Subject Headings:* **1. Balloon clusters 2. Cosmic ray measurement 3. Stratospheric research.**—*G.T.*

**7C–20** 551.521.64

Thompson, Julian L., **Solar diurnal variation of cosmic-ray intensity as a function of latitude.** *Physical Review,* 2d Ser., 52(2):140–141, July 15, **1937.** 2 figs., table. **DLC**—Systematic measurements of cosmic ray intensity were made by A. H. Compton and R. N. Turner on eleven trips between Vancouver and Sydney (1936–1937). The data obtained are presented here in tabular and graphical arrangements designed to show the effect of latitude (geomag. lat. 55°N–42°S) on the diurnal variation of cosmic ray intensity. The study confirms the existence of an equatorial dip in mean intensity of cosmic radiation (as suggested by Millikan) and brings out the constancy of diurnal cosmic ray intensity variation between 55°N and 40°S geom. lat. *Subject Headings:* **1. Cosmic ray diurnal variations 2. Latitude effects on cosmic rays. I. Compton, A. H. II. Turner, R. N.** —*G.T.*

## 1938

**7C–21** 551.521.64:016

†Michlnickel, Erwin (*Potsdam*), **Höhenstrahlung (Ultrastrahlung).** [Cosmic radiation.] Dresden, Verl. Theodor Steinkopff, **1938.** 316 p. 69 figs., 23 tables, bibliogs. at end of each ch. (over 2700 refs.). *Wissenschaftliche Forschungsberichte, Naturwissenschaftliche Reihe* (ed. by Raphael

Ed. Liesegang) v. 44. Also lithoprinted, Ann Arbor, Michigan, Edwards, **1944.** **DLC**—A thorough summary of cosmic ray research up to the end of 1937 including a discussion of the effect, intensity, direction, hardness and nature of cosmic rays; cosmic rays in the electric and magnetic fields; secondary and primary radiation and origin of cosmic radiation. An extensive list of references is appended to each chapter and a bibliography of 77 works containing major reviews of the entire field completes the volume. (*Same item as* 6B-36, Feb. 1955, *MAB.*) *Subject Headings:* **1. Cosmic ray bibliographies 2. Cosmic ray research 3. Cosmic radiation.**—*M.L.R.*

**7C–22** 551.521.64

*Tielsch, Herbert, **Beeinflussung der Ultrastrahlung durch das Wetter nach Messungen während der Jahre 1932/34 zu Königsberg (Pr.).** [Effect of weather upon cosmic radiation according to measurements during 1932/34 at Königsberg (Pr.).] *Germany. Reichsamt für Wetterdienst, Wissenschaftliche Abhandlungen,* 4(2), **1938.** 21 p. 12 figs., 12 tables, numerous refs. **DLC**—The effect of various meteorological factors upon the intensity of cosmic radiation was investigated by means of an ionization chamber under completely shielded and partially shielded conditions. Sensitivity of apparatus increases with rising room temperature. Increasing barometric pressure, increasing water vapor pressure and increasing depth of snow cover reduce ionization intensity of radiation. Cloudiness increases ionization intensity, insolation diminishes it; maximum intensity of ionization during SW wind, minimum during NW wind. From 1932 to 1934 intensity of radiation declined 1.2 percent per month. Maximum ionization intensity at 3 o'clock sidereal time and minimum at 15 o'clock. On the basis of Central European Time, ionization intensity is greater during the day than at night. Daily march of ionization intensity is determined by daily march of water vapor pressure. (*Same item as* 2.2–85, Feb. 1951, *MAB.*) *Subject Headings:* **1. Meteorological influences 2. Cosmic radiation 3. Kaliningrad, U.S.S.R.**—*I.L.D.*

## 1939

**7C–23** 551.521.9:612

Düll, Bernhard and Düll, T., **Kosmisch-physikalische Störungen der Ionosphäre, Troposphäre und Biosphäre.** [Cosmic-physical disturbances of the ionosphere, troposphere and biosphere.] *Meteorologische Zeitschrift, Bioklimatische Beiblätter,* 6(2, 3):65–76, 131, 134, **1939.** 22 figs. **DWB**—The authors stress the fact of the periodic appearance of penetrating corpuscular and wave radiations in the ionosphere and troposphere and that these radiations have biologic effects. The first article contains a discussion of the physical properties of the sun including its surface features and its spectrum; the origin and properties of cosmic radiation, the relationship between cosmic radiation and sunspots, eruptions in the chromosphere, aurora borealis and geomagnetic disturbances; the biological action of cosmic rays and of secondary radiations such as a rise in the mutation rate of *Drosophila melanogaster*, a decline in the fertility of guinea pigs and in the regeneration rate of skin epithelium of guinea pigs; the formation of "penetrating electrons" in the ionosphere; variations and disturbances of the earth's magnetic field and their relationship to the occurrence of "clicks" and "whistlers" and to the occurrence of "elementary geomagnetic waves"; the aurora borealis and its possible biologic action such as intensification of rheumatic pains, etc. In the second article the authors discuss the relationship of the troposphere to solar eruptions and ionospheric processes including that between solar activity, aurora borealis and cirrus clouds and haloes, solar activity and tropospheric temperatures and precipitation, and the relationship between solar activity, ionosphere, geomagnetic and barometric pressure in the troposphere. The biological effects of these rays are presumably similar to those of X and radium rays. The biological action of high frequency electric waves upon nervous activity is illustrated by the effect upon a nerve-muscle preparation and upon colloids. (*Same item as* 4H–67, Aug. 1953, *MAB.*) *Subject Headings:* **1. Cosmic radiation 2. Photobiological effects.**

**7C–24** 551.521.64(02)

Millikan, Robert Andrews, **Cosmic rays: three lectures. Being the revision of the 1936 Page-Barbour Lectures of the Univ. of Virginia and the 1937 John Joly Lectures of Trinity College, Dublin.** N. Y., Macmillan, **1939.** 134 p. 42 figs., 5 tables, refs. Trans. into Italian as **I raggi cosmici.** Turin, Giulio Einaudi, **1941.** 139 p. 28 figs., 3 tables, refs. **DLC**—The first lecture in this book is concerned with the discovery of cosmic rays and its significance, with general remarks on science, the electromagnetic spectrum and atomic physics. The second lecture, on superpower particles, deals with the nuclear physics aspects, and the third lecture with the earth's magnetic field and cosmic ray energies. The latter goes into great detail regarding the history of fundamental discoveries, especially by the author and collaborators, of the latitude, longitude, altitude and geomagnetic effects on cosmic rays from 1922–1938, and on the energies and the possible origin of cosmic rays. *Subject Headings:* **1. Cosmic ray textbooks 2. Geomagnetic effects on cosmic rays 3. Translations.**—*M.R.*

## 1943

**7C–25** 551.521.64(08)

Academia Brasileira de Ciências, Rio de Janeiro, **Symposium sôbre raios côsmicos, Agosto 4–8, 1941.** [Symposium on cosmic rays, Aug. 4–8, 1941.] Rio de Janeiro, Imprensa Nacional, **1943.** 180 p. figs., tables, refs. **DLC**—Contains over twenty papers presented at the symposium, most of them dealing with instrumentation, methods of measurement and various physical properties of cosmic rays. From the point of view of cosmic ray intensity variations the following papers are of particular interest: Compton, Arthur H., **On the fluctuations of cosmic rays** (p. 59–66); Monteux, Y.; Occhialini, G. and de Souza Santos, M. D., **The influence of a solar eclipsis on the cosmic ray intensity** (p. 70–80); Hilberry, Norman and Hepburn Hilberry, Ann, **Cosmic-ray studies in the Andes of southern Peru** (p. 85–93); Roser, F. X., **On the temperature effect in cosmic radiation** (p. 105–112); Jesse, P., **The latitude effect for the hard component of cosmic rays** (p. 113–121); Wollan, E. O., **On the production of mesotrons at high altitudes** (p. 123–127); and Gross, B., **On the latitude effect of cosmic rays** (p. 141–145). *Subject Headings:* **1. Cosmic ray symposia 2. Rio de Janeiro, Brazil.** —*G.T.*

**7C–26** 551.521.64:551.54:527(265/6)

Sekido, Yataro; Asano, Yosihiro and Masuda, Tokio, **Cosmic rays on the Pacific Ocean, Pt. I, Latitude effect. Pt. 2, On the barometer effect of cosmic rays.** *Tokyo. Institute of Physical and Chemical Research, Scientific Papers*, 40(1136/1139):439–466, July **1943.** figs., tables, refs. **DWB**—From April 1937 to April 1939 measurements were made on board Japanese vessels between Japan and Melbourne, Australia, and Japan and Seattle. Results compared with those of TURNER and COMPTON for the route from Vancouver–Sydney (March 1936–Jan. 1937), and GOLD (July 1937–Sept. 1938). Instruments are described. Barometer and temperature data for every two hours used to determine pressure effect. Latitude effect (53°N to 45°S) is plotted for each voyage, each season and for the year, and for various authorities. Atmospheric and magnetic latitude effects also shown graphically. Latitude effect is more important than atmospheric (temperature) effect, as high surface temperatures are somewhat compensated by corresponding low tropopause and stratosphere temperatures and vice versa, so mean temperature of the atmosphere does not vary as much as do surface temperatures. Temperature and longitude effects removed from absorbed latitude effects to give true latitude effects. In Pt. 2 the barometric effect is analyzed for the 10 sections of the 2 routes. Latitude variations of $\beta$ (barometer effect) and $\sigma_t$ ("barometer-uncorrelated fluctuation") shown graphically and discussed statistically. (*Same item as* 4I–146, Sept. 1953, *MAB.*) *Subject Headings:* **1. Cosmic ray variations 2. Latitude effects on cosmic rays 3. Pressure effects on cosmic rays 4. Pacific Ocean.**—*M.R.*

## 1945

**7C–27** 551.521.64:537.591.1

Alikhanov, A. and Alikhanian, A., **Sostav miagkoĭ komponenty kosmicheskikh lucheĭ na vysote 3250 m nad urovnem moria.** [The composition of the soft component of cosmic radiation at 3250 m above sea level.] *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, 15(4/5):145–160, **1945.** 10 figs., 8 tables, 11 refs., eqs. English summary p. 160. **DLC**—Results of investigations of the composition of the soft component of cosmic radiation carried out during three expeditions on Mt. Alagöz in Armenia (13,250 ft) in 1942, 1943 and 1944 are presented and discussed. Measurements were made with counters and an ionization camera and show that there is a systematic difference between data obtained by the two methods. This is due to the presence in the soft component of particles having an ionization power 2.5 to 3.5 times larger than that of the relativistic particles. It is also shown that these particles amount to about 20% of the intensity of the mesotrons, and they are not genetically connected with the electrons and quanta or the mesotrons, and that they are produced by an independent component called the "third" component. *Subject Headings:* **1. Soft cosmic rays 2. Mt. Alagöz, U.S.S.R.**—*A.M.P.*

**7C–28** 551.521.64:551.586:616

George, E. P.; George, M.; Booth, Joan and Horning, E. S., **Influence of cosmic radiation on induced carcinogenesis in mice.** *Nature*, London, 164(4181):1044–1045, Dec. 17, **1945.** 2 tables, 3 refs. **DLC**—The effect of cosmic radiation on carcinogenesis in mice was investigated on the Jungfraujoch. Two hundred and fifty mice were inoculated with methylcholanthrene and equal groups were exposed in a tunnel under 60 m of rock (control group), in a cosmic ray chamber and in a similar chamber shielded with 2 cm thick lead screen. Total ionization measured was negligible and was greater in tunnel than in shielded cosmic ray chamber. The results were inconclusive. The experiments of FIGGE were repeated at sea level but his results were not confirmed. The late period of appearance of cancer in controls, shielded and non-shielded animals showed a random variation. (*Same item as* 4H–124, Aug. 1953, *MAB.*) *Subject Headings:* **1. Carcinogenesis 2. Biological effects of cosmic radiation 3. Jungfrau, Switzerland.**—*I.L.D.*

**7C–29** 551.521.64:537.591.5

*†Vernov, S. N., **Shirotnyĭ effekt kosmicheskikh lucheĭ v stratosfere i proverka kaskadnoĭ teorii.** [Latitude effect of cosmic rays in the stratosphere and the test of the cascade theory.] *Akademiia Nauk SSSR. Fizicheskiĭ Institut, Trudy*, 3(1):27–114, **1945.** 50 figs., 11 tables, 44 refs. In Russian; English summary p. 111–113. **DLC**—The results obtained by Russian scientists at Leningrad (1935–1936), Yerevan, Georgia, U.S.S.R. (Caucasus) (1936) and in equatorial regions (1937–1938) are analyzed to show latitude and altitude effects on cosmic rays. These results bear out the conclusions of MILLIKAN, NEHER, and others, obtained in other parts of the world, i.e., that the intensity of cosmic rays is 4 times as great in high latitudes as in equatorial regions. The article also contains a comprehensive analysis of other aspects of cosmic ray penetration at the surface of the earth and at high altitudes, and the physicochemical and specifically the cascade theory underlying this foreign work is thoroughly reviewed. *Subject Headings:* **1. Latitude effects on cosmic rays 2. Cosmic ray data 3. Cascade theory.**—*M.R.*

## 1946

**7C–30** 551.521.64

Feinberg, E. L., **O prirode barometricheskogo i temperaturnigo effektov kosmicheskikh lucheĭ.** [On the nature of the pressure and temperature effects of cosmic rays.] *Akademiia Nauk SSSR, Doklady*, Novaia Seriia, 53(5):421–424, **1946.** 9 refs., 12+eqs. **DLC**—A theoretical paper in which the author analyzes the dependence of the rigid component of cosmic rays on temperature variations of the atmosphere at the point of observations as well as the effect of passage of warm fronts ("air mass effect") which is closely connected with these phenomena. *Subject Headings:* **1. Pressure effects on cosmic rays 2. Temperature effects on cosmic rays.**—*A.M.P.*

**7C–31** 551.507.32 551.508.822

Korff, S. A. and Amermesh, B., **New cosmic ray radio-sonde techniques.** *Franklin Institute, Philadelphia, Journal*, 241(5):355–368, May **1946.** 7 figs., 2 refs. **DLC, DWB**—In order to carry heavy loads of cosmic ray and other aerological instruments to great heights, clusters of as many as 70 balloons were launched from the Univ. of Chicago grounds. Construction of instruments, radio circuits, launching procedures, flight experience, recovery of equipment and other details of the program are described and illustrated. (*Same item as* 7–20, July 1950 and 5E–99, May 1954, *IAB.*) *Subject Headings:* **1. Radiosondes 2. Cosmic ray instruments 3. Balloon clusters.**—*M.R.*

**7C–32** 551.521.64

†Swann, W. F. G., **Cosmic rays.** *Physical Society of London, Reports on Progress in Physics*, 10:1–51, 1944/45, pub. **1946.** 31 figs., 12 eqs. bibliog. p. 46–51. **DLC**—Progress in the field of cosmic ray research since its beginnings is reviewed in detail with illustrations of apparatus and results and close to 300 references. *Subject Headings:* **1. Cosmic radiation 2. Cosmic ray bibliographies.**—*G.T.*

**7C–33** 551.521.64:551.594.12

Veksler, V.; Dobrotin, H. and KHvoles, V., **Sil'no ionizuiushehie chastitsy v kosmicheskom zluchenii.** [Highly ionizing particles in cosmic radiation.] *Zhurnal Eksperimental'noi i Teoreticheskoĭ Fiziki*, 16(7):553–556, **1946.** 3 refs., 2 figs. English summary p. 556. **DLC**—Results of measurements of the number of highly ionizing particles in cosmic rays carried out at a 3860 m altitude in the Murghab region of Pamirs in the autumn of 1946 are presented. They show that the number of particles whose ionization power exceeds 3–4 times the ionization of fast mesotrons is less than half a percent of the number of penetrating particles of cosmic rays. *Subject Headings:* **1. Ionizing rays 2. Cosmic ray penetration 3. Pamirs, U.S.S.R.**—*A.M.P.*

**7C–34** 551.521.64 551.508.25

Vernov, S. N.; Grigor'ev, N. L. and Savin, F. D., **Izmerenie tolchkov, sozdavaemykh kosmicheskimi luchami v stratosfere, s pomoshch'iu ionizatsionnoĭ kamery.** [Measurement of impulses produced by cosmic rays in the stratosphere with aid of ionization camera.] *Akademiia Nauk SSSR, Doklady*, 61(5):815–816, **1948.** fig., ref. **DLC**—A report on results of measurements of the dependence of the extent of atomic nuclei fission on the altitude of the observation point. The authors describe the portable equipment which was used to register the impacts in an ionization camera produced by cosmic rays in the stratosphere. Results of experiments show that the amount of collisions increases rapidly with height up to 14 km. According to measurements, primary cosmic particles moving vertically are absorbed after having passed a layer of substance corresponding to 100 g/cm². Therefore the global intensity of primary cosmic rays is considerably smaller at a 20 km altitude, then it is at higher altitudes. *Subject Heading:* **1. Cosmic ray penetration.**—*A.M.P.*

## 1947

**7C–35** 551.521.9:551.586:61(

Figge, F. H. J., **Cosmic radiation and cancer.** *Science*, 105:323–325, March 29, **1947.** table 3 refs. **DLC**—Attempt was made to intensify the rate of cosmic radiation by various combinations of lead plates and to compare the rate of carcinogenesis in mice exposed to intensified cosmic radiation with those exposed to normal cosmic radiation. Hundred and eighty-four C3H mice were injected with methylcholanthrene and divided into 8 groups. Tumors in controls, no lead shielding being used, developed more slowly than in mice covered with lead plate. The 50% latent period was 9.( weeks for the controls and 6.7 for experimental animals. Induction of tumors was increased with amount of lead shielding, indicating increased ionizing radiation as cosmic rays pass through lea plates. A possible hypothesis for carcinogenesis is suggested and its implication to cancer prevention is discussed. (*Same item as* 4H–135, Aug. 1953, *MAB.*) *Subject Headings:* **1. Carcinogenesis 2. Biological effects of cosmic radiation.**—*I.L.D.*

**7C–36** 551.521.64:01(

†Harradon, H. D., **Bibliographical notes and selected references.** *Physics of the Earth*, New York, 8:679–778, **1939.** Repr. **1949.** 1523 refs. **DLC**—Sec. E (Cosmic radiation, p. 758–763) contains 82 references to papers published between 1925 and 1938. The papers referred to are either comprehensive surveys or otherwise important contributions. (For fuller abstract, *see* 6B–62 Feb. 1955, *MAB.*) *Subject Headings:* **1. Bibliographies 2. Cosmic ray bibliographies.**—*G.T.*

**7C–37** 551.521.9:612 551.521.63:551.586:612 551.521.11:61

Schultze, Rudolf, **Die biologischen wirksamen Komponente des Strahlungsklimas.** [Biologically effective components of the radiation climate.] *Naturwissenschaften*, 34(8):238–246, **1947** 11 figs., 2 tables, 21 refs. **DSG**—A comprehensive and concise survey of the radiation climate that influences living matter. The author discusses the types of radiation present on the earth's surface including matter radiation and field radiation, the physical properties of these types of radiation radiation intensities of the various types of radiation at the earth's surface, the biological action corpuscular radiation, cosmic radiation, $\gamma$-radiation and X-rays, high frequency radiation, UV visible light and infrared, anabolic and catabolic aspects of radiation, possible mode of action o radiation and utilization of radiation by the human body. (*Same item as* 4H–139, Aug. 1953 *MAB.*) *Subject Headings:* **1. Photobiological effects 2. Biological effects of cosmic radiation** —*I.L.D.*

## 1948

**7C–38** 551.521.6(

†Bagge, Erich; Molière, G.; Höcker, K. H. and Ehmert, A., **Kosmische Ultrastrahlung.** [Cosmi radiation.] (In: Bothe, Walther and Flugge, Siegfried, (eds.), **Nuclear physics and cosmic rays** Wiesbaden, Dietrich, **1948.** Vol. 1:21–106. figs., tables, 154 refs. *FIAT Review of German Science, 1939-1946.*) **DLC**—Several sections (including one on the theory of atmospheric cosmic ray showers) deal with research in Germany on distribution and variations of cosmic rays in the atmosphere. (*Same item as* 11–91, Nov. 1950, *MAB.*) *Subject Headings:* **1. Cosmic ray research 2. Cosmic ray bibliographies.**

**7C–39** 551.521.64:551.586:61(

Morris, P. A. and Nickerson, W. J., **Cosmic radiation and cancer mortality.** *Experientia* Basel, 4(7):251–255, July 15, **1948.** 15 figs., 19 refs. **DWB**—A critical examination of statistical evidence for the existence of a correlation between total intensity of cosmic radiation and cancer mortality. Intensity of cosmic radiation increases with geomagnetic and geographic latitude and with altitude; total cancer mortality increases with geographic latitude with degree of urbanization and apparently with altitude in the case of Switzerland. The primary radiation from cosmic ray is probably not different by an order of magnitude from the radiation received from natural sources to which the body is exposed. However, cosmic ray showers producing properties of ceilings, etc might increase amount of radiation received by persons spending much time indoors. Skin cancer mortality increases with decrease in latitude but mortality from breast cancer, uterine cancer and liver biliary passage cancer show no relationship with latitude. The role of complicating clinical and racial factors in determining cancer incidence is discussed. (*Same item as* 4H–144, Aug. 1953 *MAB.*) *Subject Headings:* **1. Carcinogenesis 2. Biological effects of cosmic radiation.**—*I.L.D.*

**7C–40** 551.521.6

Simons, Lennart, **Coincidence counting-apparatus for cosmic-ray work.** *Geophysica*, Helsinki 3:89–92, **1948.** 3 figs. **MH-BH**—The purpose of this coincidence counting apparatus is to register simultaneously radiation particles of beta-gamma and of gamma-gamma coincidences. Not just any particle by itself is counted, but a particle is registered as one if it passes along a definite path

hrough two counters or if two particles appear in their respective counters within a given time nterval $\theta$, which is the resolving time of the apparatus. A diagram of the apparatus and results btained with it are presented. (*Same item as* 11–93, Nov. 1950, *MAB.*) *Subject Headings:* **. Cosmic ray instruments 2. Cosmic ray measurement.**—*I.L.D.*

**7C–41** 551.521.64

Vernov, S. N. and Kulilov, A. M., **Uglovoe raspredelenie kosmicheskikh chastits v stratosfere.** Angular distribution of cosmic ray particles in the stratosphere.] *Akademiia Nauk SSSR, Doklady*, 61(6):1013–1015, **1948.** 2 figs., 6 refs. **DLC.** Translation by E. R. Hope, as *Canada. Defence Research Board. Defence Scientific Information Service, T* 158 R, Feb. 16, **1955. DWB**—Experiments, by means of a telescope containing three counters and moving continuously from 0° to 90° and back every two minutes, showed that the direction of primary cosmic ray particles is closely maintained by secondary particles in passing through the atmosphere. Any angular deviation is slight. There is a large latitudinal effect and no azimuthal asymmetry effect, which leads to conclusion that primary particles are both positively charged and negatively charged. *Subject Heading:* **1. Cosmic ray particle direction.**—*M.R.*

1949

**7C–42** 551.521.64

Bagge, Erich and Fincke, Karl, **Die Intensitätsverteilung der Höhenstrahlungsneutronen in der Atmosphäre.** [The intensity distribution of cosmic-ray neutrons in the atmosphere.] *Annalen der Physik*, 6(6):321–337, **1949.** 4 figs., 3 tables, 46 eqs. **DWB**—The distribution is calculated theoretically and found to reach a maximum intensity at 20–22 km, agreeing with the experimental determination of Yuan. (*Same item as* 5–51, May 1950, *MAB.*) *Subject Headings:* **1. Cosmic ray intensity 2. Neutron intensity.**—*C.E.P.B.*

**7C–43** 551.521.64:523.74

*Clay, J., Jongen, H. F. and Dijker, A. J., **Solar flares and the origin of cosmic radiation, Pts. 1–3.** (*K.*) *Akademie van Wetenschappen te Amsterdam, Proceedings*, 52(8/9):899–914, 923–926, Oct./Nov. **1949.** 12 graphs, 16 refs. **DLC**—Data are given in tables and graphs for several cases of sudden or marked increase in cosmic radiation reception at Amsterdam and elsewhere. Occurrences are correlated with sunspot activity of various types, with magnetic moment and with barometric pressure. Various theories of the cause of these increases are mentioned, and it is suggested that flares can be produced instantaneously by compensating combinations of sunspots, and that other stars can also produce flares of lesser intensity, but due to number, of constant total effect. *Subject Headings:* **1. Cosmic radiation 2. Sunspot effects on cosmic rays 3. Amsterdam, Netherlands.** —*M.R.*

**7C–44** 551.508.25

Chang, W. Y. and Winckler, J. R., **Cloud-chamber equipment for study of infrequent cosmic-ray processes.** *Review of Scientific Instruments*, 20(4):276–285, April **1949.** 15 figs., 3 refs. **DLC**—Detailed schematic description of equipment primarily used for the study of meson absorption by thin foils, but capable of simultaneous observations of two or more different types of cosmic ray processes, e.g., extensive air showers and meson absorption. Meson decay and shower events are presented in photographs. *Subject Headings:* **1. Cosmic ray instruments 2. Cloud chambers.** —*W.N.*

**7C–45** 551.521.64(08)

Echo Lake Cosmic Ray Symposium, June 23–28, 1949, **Proceedings.** Sponsored by Office of Naval Research, Atomic Energy Commission and the Research Corporation. Washington, D. C., Office of Naval Research, Nov. **1949.** 345 p. figs., tables, bibliog. p. 344–345, eqs. **DLC**—This report on the Echo Lake Cosmic Ray Symposium held at Idaho Springs, Colorado, from June 23 to 28, 1949, contains 77 papers and discussions by about 100 persons (listed in appendix). Many of the papers were printed later in regular journals. They are grouped under the headings: (1) Properties of mesons; (2) Nucleon interactions of cosmic rays; (3) Primary radiation and (4) Air showers. Of particular interest are the 28 papers under **Primary radiation,** involving the problem of the origin, the latitude cut-off, diurnal variations, solar effects, soft components above the atmosphere, zenith angle vs. altitude, etc., etc., by H. V. Neher, J. A. Van Allen, S. F. Singer, W. F. G. Swann, F. Oppenheimer, Herman Yagoda and others. *Subject Headings:* **1. Cosmic ray symposia 2. Echo Lake, Colo.**—*M.R.*

**7C–46** 551.521.64:551.586

†Hess, Victor F. and Eugster, Jakob, **Cosmic radiation and its biological effects.** 2nd ed. New York, Fordham University Press, **1949.** 178 p. 32 figs., 6 tables, numerous refs., eqs. **DLC**—

This monograph is a complete review of the physics of cosmic radiation and of its effect upon livin tissues. HESS discusses the physics of cosmic radiation in chapters dealing with methods of meas urement, distribution of intensity and of the direction of cosmic radiation in the atmosphere and below the surface of the earth, geographic distribution of cosmic ray intensity and influence of the earth's magnetic field, the energy spectrum of cosmic rays, the interaction of cosmic rays with matter variations of cosmic rays with time (temperature effect, diurnal variations with solar and siderea time and seasonal time, etc.) and the composition and origin of cosmic radiation. EUGSTER review the literature on the effects of cosmic radiation upon the growth of unicellular organisms, upon the mutation rate of *Drosophila melanogaster* and upon cancer incidence in mice. He also describes hi own experiments on the effect of cosmic ray showers upon living organisms. The author conclude that cosmic radiation has a definite effect upon living tissues; it is characterized by an initial stimula tion of growth followed by an inhibitory phase—and that it stimulates tumor growth in white mice A mechanism for the biologic action of cosmic rays is described. (*Same item as* 2.9–97, Sept. 1951 *MAB.*) *Subject Headings:* **1. Cosmic radiation 2. Biological effects of cosmic radiation.**—*I.L.D.*

**7C–47** 551.521.64

Höcker, K. H., **Die Komponenten der kosmischen Strahlung und ihre Intensitäten in der Atmosphäre.** [Components of cosmic radiation and their intensities in the atmosphere.] *Annale der Physik*, 6(6):353–364, **1949.** fig., 14 eqs. **DWB**—Components of cosmic radiation are protons neutrons, neutral and charged mesons, electrons, photons. The energy spectrum of protons and the origin of the different components are discussed. Finally, the intensity of the components is summarized as a function of height in the atmosphere. (*Same item as* 5–50, May 1950, *MAB.*) *Subject Headings:* **1. Cosmic ray spectrum 2. Cosmic ray intensity 3. Cosmic ray origin.**—*C.E.P.B.*

**7C–48** 551.521.64

†Jauch, J. M., **Cosmic rays, Pt. 1.** *Nucleonics*, N. Y., 4(4):39–51, April **1949.** 7 figs., 28 refs. 30 eqs. **DLC**—A comprehensive review of the entire subject: variations in height intensity; latitude with magnetic variations; soft components; hard, penetrating showers; genesis; etc. (*Same item as* 11–92, Nov. 1950, *MAB.*) *Subject Headings:* **1. Cosmic radiation 2. Review articles.**—*M.R.*

**7C–49** 551.508.25 551.507.321.2

Lofgren, E. J.; Ney, E. P. and Oppenheimer, F., **Apparatus for cloud chamber investigations with free balloons.** *Review of Scientific Instruments*, 20(1):48–51, Jan. **1949.** 6 figs., 3 refs. **DLC**—Describes the balloons and the six-hour operational instrumentation as used in eight free balloon flights about 90,000 to 100,000 ft above Camp Ripley, Minn., to take cloud-chamber pictures once per minute with 35 mm stereo-cameras. Of the six recovered balloons, five yielded about 500 photographs, of which a sample features a nuclear disintegration produced at 83,000 ft by a fast penetrating particle. (*Same item as* 5.6–57, June 1954, *MAB.*) *Subject Headings:* **1. Cosmic ray instruments 2. Sounding balloons 3. Camp Ripley, Minn.**—*W.N.*

## 1950

**7C–50** 551.521.64

Alpher, R. A., **Theoretical geomagnetic effects in cosmic radiation.** *Journal of Geophysical Research*, 55(4):437–471, Dec. **1950.** 8 figs., 16 refs., 50 eqs. **MH-BH**—The theory of geomagnetic effects upon the motion of cosmic rays is reviewed. The equations of motion are developed and the various classes of trajectories of cosmic ray particles are discussed. The determination of the Störmer cone and of the main cone, shadow cone and penumbra are presented. Procedures are given for reducing the cone diagrams to more easily usable graphical forms. "Conversion procedures involved in the application of the theory are presented." "The material presented includes curves of minimum energy of arrival, as measured in Störmer units, versus azimuth angle, for zenith angles at 10° intervals, arising from the combined Störmer and shadow cone (for all latitudes at 10° intervals) and from the main cone (at latitudes 0°, 20° and 30°). Minimum momentum in BeV/*c* and minimum energy in BeV, for protons and heavy nuclei, are given *versus* geomagnetic latitude for azimuths, N, S, E and W at all zenith angles in 15° steps." (*Same item as* 2.9–94, Sept. 1953 *MAB.*) *Subject Headings:* **1. Cosmic radiation 2. Geomagnetic effects on cosmic rays.**—*I.L.D.*

**7C–51** 551.521.64 523.75 551.510.535

†Bureau, Robert and Dauvillier, Alexandre, **L'éruption chromosphérique du 19 novembre 1949 et ses conséquences géophysiques.** [Chromospheric flare on November 19, 1949 and its geophysical consequences.] *Annales de Géophysique*, 6(2):77–103, April/June **1950.** 9 figs., 29 refs. Summaries in French and English p. 77. **MH-BH**—In the first part of this article, R. BUREAU discusses the observed correlation between chromospheric flare and an ionospheric disturbance, which is marked by the sudden fading of short radio waves and the sudden intensification of long waves. In the second part, A. DAUVILLIER describes especially designed apparatus and methods for studying

ne intensity of cosmic radiation of the earth's electro-magnetic field and the barometric pressure. The behavior of the cosmic radiation and the earth's electromagnetic field in the course of a chromospheric flare and the possible origin of cosmic radiation are discussed. (*Same item as* 2.2 84, Feb. 951, *MAB.*) *Subject Headings:* **1. Ionospheric disturbances 2. Cosmic ray intensity 3. Solar flare effects on cosmic rays** —*I.L.D.*

**7C–52** 551.521.6:523.74(54)

*Chakraborty, I. L. and Sen Chowdhury, P. K., **Sunspot activity and cosmic ray disturbances.** *Science and Culture*, Calcutta, 15(12):490 491, June **1950.** 2 figs., table, 3 refs. **DLC**—A comparative table of observations made during the period Feb. 17–March 2, 1950 (which included the passage of a big group of sunspots) is presented and commented on. The data concern (1) number of sunspots (Kodaikanal), (2) solar flare (different places), (3) radio fadeout (Delhi), (4) magnetic storm (Kodaikanal) and (5) variation in cosmic ray intensity (Calcutta). *Subject Headings:* **1. Sunspot effects on cosmic rays 2. Cosmic ray variations 3. India.**—*G.T.*

**7C–53** 551.521.64(02) 550.385(02)

Dauvillier, Alexandre (*Prof., Collège de France*), **Magnétisme terrestre et rayons cosmiques.** [Terrestrial magnetism and cosmic rays.] (In: **Problèmes de Geomagnétisme,** by J. P. Rothé et al. Paris, Revue D'Optique Théorique et Instrumentale, **1950.** p. 77–91. 3 figs., 28 refs.) **DLC**—Effects of latitude, longitude and east-west asymmetry, periodic variations, magnetic storms, etc. discussed in textbook fashion. *Subject Headings:* **1. Cosmic ray textbooks 2. Magnetic storms.** —*M.R.*

**7C–54** 551.521.64:551.501.7

Ferrand, P.; Morellet, D. and Bousser, F., **Technique de ballons-sonde groupes pour l'étude du rayonnement cosmique en haute atmosphère.** [Cluster sounding balloon technique for the study of cosmic radiation in the upper atmosphere.] *Annales de Géophysique*, 6(3):217–224, July/Sept. **1950.** 4 figs., 3 photos, eqs. **MH-BH**—At elevation of 20,000 m, at which primary cosmic radiation can be studied more precisely, special problems are encountered in the use of photographic plates with thick emulsions, in the use of cluster balloons and of electronic devices. The author describes: 1) a method of maintaining a constant temperature for the photographic plates; 2) radiosonde technique and goniometric locations and 3) the release of clusters of balloons. (*Same item as* 3.6–101, June 1952 and 5E–11, May 1954, *MAB.*) *Subject Headings:* **1. Cosmic radiation 2. Stratospheric research 3. Balloon clusters 4. Photometry.**—*I.L.D.*

**7C–55** 551.521.64:537.59

George, E. P. and Jason, A. C., **Observations on cosmic-ray penetrating showers at high altitude, sea level and below ground.** *Physical Society of London, Proceedings A*, 63:1081–1097, **1950.** 5 figs., 8 tables, 27 refs., 8 eqs. **DWB**—To study absorption of primary radiation responsible for cosmic ray showers, observations were made 30 m below ground and at sea level in London and at 3457 m in Switzerland. The apparatus and its correction for "geometry" are described. Results with absorbing layers of lead, aluminum and paraffin are discussed. It is concluded that most of the penetrating particles appear to be generated in the atmosphere. The results at sea level and 3457 m are similar; no penetrating showers were recorded below ground in 40 days. (*Same item as* 2.9–96, Sept. 1951, *MAB.*) *Subject Headings:* **1. Cosmic ray showers 2. Cosmic ray penetration.** —*C.E.P.B.*

**7C–56** 551 521.64:551.590.21

Hogg, A. R., **Cosmic rays and solar relationships.** *Journal of Atmospheric and Terrestrial Physics*, 1(1):56–62, **1950.** 6 figs., table, 16 refs. **MH-BH**—Cosmic ray intensities measured with ionization chamber at Canberra were compared with solar phenomena. An apparent 27-day recurrence is traced to an indirect relation through geomagnetism. No definite relation was found to sunspots or chromosphere eruptions unless accompanied by magnetic disturbance. (*Same item as* 2.9–98, Sept. 1951, *MAB.*) *Subject Headings:* **1. Cosmic ray intensity 2. Solar-terrestrial relationships 3. Geomagnetic effects on cosmic rays.**—*C.E.P.B.*

**7C–57** 551.521.64(94)

*Hogg, A. R., **Some time variations of cosmic rays.** *Journal of Atmospheric and Terrestrial Physics*, 1(2):114–120, **1950.** 2 figs., 2 tables, 16 refs. **MH-BH**—Five years of cosmic ray observations made at Canberra are analyzed and compared with results obtained in other longitudes to determine whether variations occur with sidereal factors or with solar or seasonal changes. The conclusion is that the solar-seasonal factor is the principal one. This analysis confirms results obtained by FORBUSH, showing that variations with sidereal time amount to only 0.1% or less at Cheltenham (595 days) and Huancayo (395 days). (*Same item as* 2.9–99, Sept. 1951, *MAB.*)

*Subject Headings:* **1. Cosmic ray variations 2. Solar-seasonal influences on cosmic rays 3. Canberra, Australia.**—*M.R.*

**7C–58** 551.521.64(02

†Jánossy, Lewis, **Cosmic rays.** 2d ed. Oxford, Clarendon Press, **1950.** 454 p. 141 figs. 10 plates, 9 tables, bibliog. p. 431–442. *International Series of Monographs on Physics,* Oxford. **DLC**—This 2d edition contains a few changes over the first (1947) edition to take care of recent advances, but does not constitute a complete revision. It covers in an orderly manner both the theoretical and the experimental results of research on the various aspects of the subject, without going into great detail on the quantum theory or measuring techniques. The first four chapters cover the discovery, nature, measurement, theory, and behavior at sea level or underground. Ch. 5 deals with mesons; 6, the soft component; 7, geomagnetic effects; 8, air showers and 9, the origin of the meson component. Appendices go into statistical treatment of observations, electron currents, photography, etc. *Subject Headings:* **1. Cosmic ray textbooks 2. Cosmic radiation.**—*M.R.*

**7C–59** 551.521.64:550.385

Kato, Yoshio and Kanno, Tsunekichi, **On the variations of the cosmic-ray intensity associated with the magnetic storm.** *Tohoku University, Science Reports, 5th Ser., Geophysics,* 2(3):153–157, Dec. **1950.** 4 figs., 2 tables, 15 refs., 2 eqs. **DWB**—A theoretical attempt to correlate the variation of cosmic ray intensity with the radius of the equatorial ring-current. It is shown that the calculated correlation coefficient is not high enough, and the reasons are discussed. (*Same item as* 3.8–100, Aug. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray variations 2. Magnetic storms 3. Geomagnetic effects on cosmic rays.**—*W.N.*

**7C–60** 551.521.64(02

Leprince-Ringuet, Louis, **Cosmic rays.** Foreword by John A. Wheeler. Trans. from the French by Fay Ajzenberg. N. Y., Prentice-Hall, **1950.** 290 p. 68 figs., numerous plates (photos). **List of investigators of cosmic radiation,** p. 280–286. **DLC**—The French original of this text has been supplemented in the American edition to include discoveries since 1945 (through 1948). The general tenor of the text is nonmathematical, the theory being presented lucidly in the text and with the aid of well-chosen illustrations. Basic concepts are treated in Ch. 1–3; sea-level characteristics, in Ch. 4; latitude and magnetic effects, in Ch. 5, high altitude in Ch. 6 and 7; showers, hard and soft components, nuclear effects and theory of mesons in Ch. 8–15; origin of cosmic rays in Ch. 16, and a list of investigators and their affiliations in the appendix. A subject index is also included. The author gives an especially good presentation of balloon research of high altitude effects; laboratories and instruments, and of discoveries he has made in his observatory at Chamonix, French Alps (Aiguille du Midi—3650 m). *Subject Headings:* **1. Cosmic ray textbooks 2. Cosmic radiation 3. Chamonix, France. I. Wheeler, A. II. Ajzenberg, Fay (trans.).**—*M.R.*

**7C–61** 551.521.64:551.547.3(485)

Lindholm, F., **Atmospheric effects on cosmic radiation, air-mass absorption and meson decay.** *Tellus,* 2(1):63–67, Feb. **1950.** 4 figs., 2 tables, 10 refs., eqs. **DWB**—At Stockholm it was found that 24 hr means of cosmic radiation vary by ±5% over long period means. The bulk of this variation is due to atmospheric effects. Mesons are produced at about the 100 mb layer, but radiosonde data seldom go above 200 mb. Enough correlation was found between pressure and rate of decay of mesons during the passage of two cyclones to warrant use of meson decay data for determining the height of the 200 mb layer. Conclusions regarding effect of latitude in relation to meson decay and slope of 96 mb pressure surface are drawn from SCHERHAG's data. (*Same item as* 7–59, July 1950, *MAB.*) *Subject Headings:* **1. Cosmic ray variations 2. Meson decay 3. Atmospheric effects on cosmic rays 4. Stockholm, Sweden.**—*M.R.*

**7C–62** 551.521.64 537.59

Lock, W. O. and Muirhead, H., **Cosmic rays, Pt. I, Soft and hard radiation. Part 2, Mesons.** *Weather,* 5(4,5):133–137; 172–175, April, May **1950.** 3 photos. **DWB**—Pt. I describes method of investigating cosmic radiation by ionization, discovery of soft and penetrating components by thickness of lead penetrated. Pt. II describes theory and observation of positive and negative mesons of two types, $\pi$ (286 times mass of electron), decaying to $\mu$ (216 $m_e$) which decay to electrons. Life of $\pi$ mesons $1.2\times10^{-8}$ second. A heavier particle $k$ is about 1000 $m_e$ decaying into 3 charged mesons. Penetrating showers also described. (*Same item as* 8–56, Aug. 1950, *MAB.*) *Subject Headings:* **1. Cosmic radiation 2. Meson types 3. Meson theory.**—*M.R.*

**7C–63** 551.510.535:551.521.64:550.385

Müller, Rolf; Augustin, Otto; Menzel, Willi et al., **Solare und terrestrische Beobachtungen während des Mögel-Dellinger-Effektes (SID) am 19. November 1949.** [Solar and terrestrial obser-

...tions during the Mögel-Dellinger effect (SID) on November 19, 1949.] *Journal of Atmospheric & Terrestrial Physics*, 1(1):37–42, 1950. 9 figs., table, 10 refs. MH-BH—A bright chromosphere ...ption began Nov. 19, 1949 at 10 h 34 min. Cosmic radiation shown by ionizing effect or counter (neutrons at several stations increased by 10–20%) in 10–20 min, confirming earlier observations. ...no soundings on 1-16 MHz gave no reflection from E layer and none from F at lower frequencies. ...ions on 1800 KHz jailed at 10:30 and field strength of transmission on 6078.9 KHz from 400 km ...nearly to zero at 10:50. Geomagnetism showed no special disturbance so that slow corpuscles ...m the eruption failed to reach the earth. (*Solar rem. a.* 2.9–66, Sept. 1951, *M.A.B.*) *Subject Headings:* **1. Radio fading 2. Solar flare effects on cosmic rays.**—*C.E.P.B.*

**7C–64** 551.521.64:550.385(54)

Parkash, Om and Sarna, H. R. On the storm variations of cosmic ray intensity. *East Punjab University, Research Bulletin, Physics*, No. 10:111–116, Nov. 1950. 14 refs. DWB—Effects of magnetic storms on cosmic ray intensity, as determined from research done for two months in India. Correlations based on cosmic ray data obtained in 1947 at Lahore and magnetic data from Bombay are not significant except on two extremely disturbed days when results were marked but opposing in sign on the two respective days. (*Solar rem. a.* 3.1–112, Jan. 1952, *M.A.B.*) *Subject Headings:* **1. Cosmic ray intensity 2. Magnetic storms 3. India.**—*M.R.*

**7C–65** 551.521.64:523.7

Pomerantz, Martin A. **Die Sonne hat kein merkliches permanentes Magnetfeld.** [The sun has no perceptibly permanent magnetic field.] *Umschau*, Frankfurt a.M., 50:19:601–603, Oct. 1950. 3 figs., 9 refs. DLC—Popular report on measurement of cosmic radiation by means of balloons carrying equipment of the Geiger-Müller-tube type with direct radio communication with a ground station. The ascents were arranged by Bartol Research Foundation, Franklin Institute at Swarthmore, Penna., 52°N. and the National Geographic Society at Fort Churchill, Manitoba, 59°N. Comparative data are found to indicate that the magnetic field of the sun is variable. Sounding apparatus used at Swarthmore and participants of the project, including the author, are shown in action. *Subject Headings:* **1. Cosmic ray measurement 2. Sun's magnetic field ...Swarthmore, Pennsylvania 4. Fort Churchill, Manitoba.**—*G.T.*

**7C–66** 551.521.64:539.09

†Powell, C. F., **Mesons.** *Physical Society of London, Reports on Progress in Physics*, 13:350–424, 1950. 42 figs., 4 tables, bibliog. p. 422–424, 6 eqs. DWB—A thorough and well outlined review of the tremendous quantity of literature and progress in this field. History of field, nomenclature, mass and mode of decay, and properties of $\pi$ mesons and $\mu$ mesons; artificial production and creation by cosmic radiation; neutral mesons, other types of mesons; production of mesons in the atmosphere (p. 416–18), and outstanding problems constitute the principle chapters of this survey. (*Some rem.* at 5.7–103, July 1954, *M.A.B.*) *Subject Headings:* **1. Cosmic radiation 2. Meson production ...Progress in physics.**—*M.R.*

**7C–67** 551.521.64

Rathgeber, H. D., **Remarks on the latitude effect of cosmic rays at sea-level.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences*, 3:2:183–192, June 1950. 3 figs., 2 tables, 4 refs., 9 eqs. MH-BH—The intensity of cosmic radiation was measured with several Geiger counter telescopes of different designs during a voyage from Australia to Japan. Formulas for determining the cosmic ray intensity for a zenith angle with a spherical ionization chamber with a narrow angle coincidence telescope and with a wide angle coincidence telescope are given. The latitude effect of cosmic rays at sea level (averaged over all azimuths) is approximately proportional to $\cos^2 1.2\zeta$, where $\zeta$ is the zenith angle of the incident radiation and the latitude effect for rays of vertical incidence averages 18%. After correction for longitude and zenith angle, Geiger counter telescope and ionization measurements do not differ by more than their errors of measurements; the average specific ionization does not vary with latitude. From the dependence of latitude effect upon zenith angle it is shown mathematically that the zenith angle distribution of cosmic rays, measured at a fixed location, varied with latitude. The equality of latitude effect of mesons and for electrons and the latitude effect of extensive showers are explained qualitatively. (*See rem.* 2.9–100, Sept. 1951, *M.A.B.*) *Subject Headings:* **1. Cosmic ray intensity 2. Latitude effects on cosmic rays.**—*From author's abstract.*

**7C–68** 551.521.64:551.586:612

Schaefer, Hermann J., **Evaluation of present-day knowledge of cosmic radiation at extreme altitude in terms of the hazard to health.** *Journal of Aviation Medicine*, New Orleans, 21:6:375–394, 418, 1950. 4 figs., 4 tables, 11 refs. DSG—The author discusses present knowledge of cosmic radiation including the origin, energies and other physical properties of primary radiation, the

interaction of the primaries with the air blanket and the mechanism of shower production, th evaluation of the physical properties of cosmic radiation for the health hazard and the conversio of numerical data on the intensities of the various components of cosmic radiation into biologica dosage units—namely the total ionization and the heavy nuclei rays. (*Same item as* 4H–15 Aug. 1953, *MAB.*) *Subject Headings:* **1. Biological effects of cosmic radiation 2. Photobiologica effects.**—*I.L.D.*

## 1951

**7C–69** 551.521.6

Beiser, Arthur, **New light on the origin of cosmic rays.** *Physics Today*, 4(7):14–16, July 195 **DWB**—Brief article outlining two theories on the origin of cosmic rays which have been curren during the past two decades: 1) the theory that the radiation is of cosmic or interstellar origin an 2) of solar origin. A new theory, which combines these two concepts, attributed to ENRICO FERM extends the ideas of ALFVÉN regarding wandering magnetic clouds in space. The particles alread having greater than normal energy will be either speeded up or slowed down by these magneti clouds, depending on direction of impact and those which are speeded up become the high energ cosmic rays. Frequency of protons in cosmic rays also can be predicted by this theory. (*Sam item as* 3.1–111, Jan. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray origin 2. Solar radiation** —*M.R.*

**7C–70** 551.521.64 551.52

Buettner, Konrad, **Radiation effects on man in space.** *American Meteorological Society Bulletin*, 32(5):183–185, May **1951.** 9 refs. **DWB**—The following types of radiation in space ar discussed: 1) cosmic ray heavy primaries; 2) cosmic ray showers and cosmic ray microwaves o galactic and solar origin; 3) hard solar X-rays and 4) Takata reaction which presumably is the resul of penetrating ionizing solar radiation. The Takata reaction was not confirmed by BUETTNER (*Same item as* 3.5–173, May 1952, *MAB.*) *Subject Headings:* **1. Biological effects of cosmic radiatio 2. Takata reaction.**—*I.L.D.*

**7C–71** 551.521.64:53

Cornell University, **Study of high energy mesons by experiments performed in a deep mine** Contract AF 19(122)-439, Progress Report No. 1, Sept. 15, **1951.** 43 p. 17 figs., 4 tables, 10 refs eqs. Appendix A: **Abstract of Origin and behavior of cosmic rays observed at 1600 M.W.E. under ground.** Appendix B: Cocconi, Guiseppe, **On the origin of the cosmic radiation. DWB**—Th results show that (1) the penetrating particles are high-energy mu mesons, and the absorption i but 1%. Previous suggestions on locally generated secondaries of neutral particles is thus con tradicted. (2) Contrary to recent experiments by other workers it was found that most or all high energy mu mesons originated through decay of pi mesons (which are created by nuclear interaction of $5 \times 10^{13}$ ev average energy). (3) The occurrence of mesons is entirely within about 20 m of each other which indicates 10 m of the core of the air shower. (4) Variation in time of the intensity gav negative results and the preliminary results of intensity variation with sea level temperature indicat that it is smaller than previously reported. (5) The diurnal variations are less than 3%, contradict ing a recent report in the literature. (6) Cosmic ray primaries do not originate within the sola system and do not include many heavy nuclei. *Subject Headings:* **1. Cosmic radiation 2. Cosmi ray origin 3. Mesons. I. Cocconi, Guiseppe II. Greisen, Kenneth.**—*W.N.*

**7C–72** 551.521.6

†Daudin, Jean, **Le soleil et les rayons cosmiques.** [The sun and cosmic rays.] *International Council of Scientific Unions, Brussels, 7th Report of the Commission for the Study of Solar and Ter restrial Relationships*, pub. Paris, **1951.** p. 135–164. 4 figs., 3 tables, 119 refs. **DWB**—Describe nature of cosmic radiation and heavy nuclei, relations to geomagnetic latitude, spectral energy Observed variations with magnetic storms, sunspots and chromospheric eruptions, and variations i periods of 27 days, 24 and 12 hours, are summarized. Theories of origin are discussed on basis o solar magnetic field and solar cosmic eruptions. Various views of energy of cosmic rays are con sidered. On the question of solar or galactic origin no definite conclusion is reached. (*Same item as* 3.10–158, Oct. 1952, *MAB.*) *Subject Heading:* **1. Cosmic radiation.**—*C.E.P.B.*

**7C–73** 551.521.64:621.81

Dolbear, D. W. N.; Elliot, H. and Dawton, D. I., **The cosmic ray intensity and radio fade-outs** *Journal of Atmospheric and Terrestrial Physics*, 1(3):187–188, **1951.** 6 refs. **DWB**—The effect o small solar flares, causing short radio fadeouts, on cosmic ray intensity, was examined by superi posing curves of cosmic radiation at Manchester before, during and after 35 fadeouts between 9 h and 16 h S.M.T. and 69 between 16 h and 9 h. Daytime results showed an increase of cosmic rays by 0.3% at time of fadeout; at night this effect did not appear. (*Same item as* 2.9–95, Sept. 1951

*MAB.) Subject Headings:* **1. Cosmic ray intensity 2. Radio fading 3. Manchester, England.**—*C.E.P.B.*

**7C–74** 551.521.64:551.547.3:551.524.7

Dolbear, D. W. N. and Elliot, H., **Seasonal and diurnal variations in cosmic ray intensity.** *Journal of Atmospheric and Terrestrial Physics*, 1(4):215–222, **1951.** 2 figs., 6 tables, 8 refs. **DWB**—The seasonal variation in cosmic ray intensity has been measured with two independent Geiger-Müller counter sets shielded with 35 cm of lead. It is shown that the variation is due to atmospheric temperature and pressure changes and can be completely explained only with the aid of DUPERIER's positive temperature effect. In addition it appears that the diurnal variation may partly be accounted for by the same mechanism. (*Same item as* 3.7-123, July 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray diurnal variations 2. Temperature effects on cosmic rays 3. Pressure effects on cosmic rays.**—*Authors' abstract.*

**7C–75** 551.521.64

Elliot, H. and Dolbear, D. W. N., **Directional measurements of the diurnal variation of cosmic ray intensity.** *Journal of Atmospheric and Terrestrial Physics*, 1(4):205–211, **1951.** 12 figs., 16 refs., eqs. **DWB**—The results of former measurements of the solar daily variation in cosmic ray intensity in the north and south directions have been confirmed by new data from shielded and unshielded recorders. The interpretation that the difference between the variations for the two directions is due to a nonisotropic distribution of the primary cosmic rays is strongly supported by measurements in the east and west directions. This lack of complete isotropy is discussed in relation to the solar streams which cause geomagnetic disturbances and which are here assumed to be polarized in a solar magnetic field. Good agreement is obtained between the observed effect and that calculated on this basis assuming a solar equatorial field strength of 8 gauss. It is shown that geomagnetic disturbances have a pronounced effect on the solar daily variation and on the south minus north difference. A small variation with sidereal time is shown to exist in the Manchester data and this is confirmed by an analysis of ionization chamber data from Huancayo, Christchurch and Cheltenham. The sidereal daily variation thus found has an amplitude of about .002% with a time of maximum at about 0500 hr. This is opposite in phase to the variation expected on the basis of the Compton-Getting effect and therefore a galactic origin for the primary cosmic rays is indicated. (*Same item as* 3.10–159, Oct. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray directional measurement 2. Cosmic ray diurnal variations 3. Cosmic ray intensity 4. Geomagnetic effects on cosmic rays.**—*Authors' abstract.*

**7C–76** 551.521.64:551.594.5

Gerson, N. C., **Correlation of auroras with increased cosmic ray intensities (November 19, 1949).** *Nature*, London, 167(4257):894–895, June 2, **1951.** table, 9 refs. **DWB**—A solar flare of importance 3 was observed 10.29–11.19 G.M.T., associated with considerable (up to 200%) increase of cosmic ray activity, ionospheric disturbance and many records of aurora, both Northern and Southern Hemispheres. (*Same item as* 2.11–190, Nov. 1951, *MAB.*) *Subject Headings:* **1. Auroras 2. Cosmic ray intensity 3. Solar flare effects on cosmic rays 4. Northern Hemisphere 5. Southern Hemisphere.**—*C.E.P.B.*

**7C–77** 551.521.64

Hazen, Wayne Eskett and Sherman, Noah (*both, Mich. Univ.*), **Measurement of penetrating cosmic-ray particles.** Michigan. Univ., Engineering Research Institute, Contract AF 19(122)-465, Report No. 3, Dec. **31, 1951.** 73 p. 3 figs., eqs., 30 refs. **DWB**—The variations in the intensity of $\mu$-mesons were measured in a salt mine at Detroit, Mich., 1100 ft below ground and expressed as functions of simultaneous variations in temperature at the 100, 150, 200 and 300 mb levels and at sea level. The correlation analysis was performed for each pressure level separately and the obtained values of decay are found to be considerably smaller than those predicted on a theoretical basis. The recently discovered x-meson is suggested as a possible parent of high-energy $\pi$-mesons. The apparatus and methods used in the experiments are described, data obtained are graphically represented and their mathematical treatment is explained. Chapters dealing with the method of least squares, with the correlation coefficient, with the statistical significance of correlation and with the $\mu$-meson spectrum of $\pi$-meson decay are appended. (For three-page Report, No. 2, *see* 3.10–161, Oct. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray penetration 2. Meson intensity 3. Detroit, Mich.**—*G.T.*

**7C–78** 551.521.64:551.524.7

Iona, Mario, Jr., **Correlation of meteorological parameters with cosmic ray data.** Denver. Univ., Contract AF19(122)-54, Report No. 1 & 8, July 15 ,1949-March 31, **1951.** approx. 25 p. each report. plates. **DWB**—Work consists of a review of literature on the subject, theoretical treatment

of magnitude of meteorological changes such as temperature and humidity in the free atmosphere; design of equipment for measuring and recording meson intensities at the surface and by balloon; installation and operation of equipment at Echo Lake (10,700 ft) and Mt. Evans, Colorado (14,150 ft) for 3 months; and analysis of data. (*Same item as* 3.10–162, Oct. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray research 2. Cosmic ray instruments 3. Upper air computations 4. Correlations 5. Meson intensity.**—*M.R.*

**7C–79** 551.586:551.521.64:612

Krebs, A. J., **Possibility of biological effects of cosmic rays in high altitudes.** *Journal of Aviation Medicine*, 21(6):481–494, **1951.** 3 figs., 4 tables, 75 refs. **DSG**—In this review of the physics and biological effects of cosmic rays, the author considers: heavy nuclei in the primary component of cosmic radiation, cosmic ray stars including the exploding and evaporating stars and nature of the star exciting radiation; mesons; origin of cosmic rays, and the biological effects of cosmic rays as manifested by mutations and carcinogenesis. (*Same item as* 4H–160, Aug. 1953, *MAB.*) *Subject Headings:* **1. Biological effects of cosmic radiation 2. Cosmic radiation 3. Carcinogenesis.**—*I.L.D.*

**7C–80** 551.521.64:551.524.7

Michigan. Univ. Engineering Research Institute, **Cosmic ray particles.** Contract AF 19(122)-465, First Quarterly Progress Report, April 1–July 30, **1951.** 2 p. **DWB**—This investigation is concerned with determining a possible correlation between the penetrating component in cosmic rays observed underground and the temperature in the upper third of the atmosphere. Data on the correlation between temperature and atmospheric pressure at atmospheric pressure levels from 100 to 300 mb are given. Highest correlation obtained at 300 mb. (*Same item as* 3.10–163, Oct. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray penetration 2. Correlations 3. Upper air computations. I. Hazen, W. E. II. Sherman, Noah.**—*I.L.D.*

**7C–81** 551.521.64(497.2)

Mitrani, Leon, **V'rkhu razpredelenieto na zeniten 'g'l na generirashchata tesni, meki poro komponenta v kosmichnoto l'cheni.** [Zenith angle dependence of the cosmic ray component which produces cascade electron showers.] *Bulgarska Akademiia na Naukite, Sofia, Izvestiia, Ser. Fizicheska*, 2:99–106, Jan./Dec. **1951.** 4 figs., 19 refs. Russian and English summaries p. 104–105. **DLC**—A device was developed and put into use at Sofia for investigation of the distribution of the shower component of cosmic rays with zenith angle and comparing results with the predicted Rossi-curve. A complete measurement of the Rossi-curve was preferred for every zenith angle up to 4 cm of lead, showing no sign of displacement $\frac{1}{2}$ up to 60° zenith angle, thus agreeing with high altitude measurement but not with theoretical predictions. It is concluded that the shower producing element is absorbed more easily by air than is the total cosmic radiation. *Subject Headings:* **1. Cosmic ray showers 2. Zenith angle distribution of cascade showers 3. Sofia, Bulgaria.**—*From author's abstract.*

**7C–82** 551.521.64:523.7(47)

Ol', A. I., **Izmeneniia intensivnosti kosmicheskikh luchei, sviazannye s deiatel'nost'iu solntsa.** [Variations of the intensity of cosmic rays as a result of solar activity.] *Priroda*, Moscow, 40(11):48–52, **1951.** 3 figs., table, 17 refs., 2 eqs. **DLC**—A detailed review of recent Russian and non-Russian studies on the variations in the intensity of cosmic radiation, namely transitory intensification and extended weakening, observed during magnetic storms. (*Same item as* 3.8–102, Aug. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray intensity 2. Cosmic ray research 3. Geomagnetic effects on cosmic rays 4. Solar activity 5. U.S.S.R.**—*I.L.D.*

**7C–83** 551.521.64:537.59

Pullar, J. D. and Dymond, E. G., **Meson production in the atmosphere.** *Philosophical Magazine*, 42(329):663–664, June **1951.** fig., 2 refs. **DWB, DLC**—The variation with height of the penetrating component of cosmic radiation was measured by a series of 7 balloon flights with radiosondes up to a maximum altitude of 124,000 ft (4 mb) at Edinburgh. The intensity at the top of the atmosphere is found by extrapolation to be 23 times the value at the ground. This figure is compared with previous estimates, and the amount due to lateral showers at low pressures is considered in determining true vertical rate. (*Same item as* 3.8–104, Aug. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray penetration 2. Meson production 3. Edinburgh, Scotland.**—*M.R.*

**7C–84** 551.521.64:523.7

Roka, E. G. von, **Sonnenaktivität und kosmische Strahlung.** [Activity of the sun and cosmic solar radiation.] *Zeitschrift für Naturforschung*, Tübingen, 6a(3):117–122, March **1951.** graphs refs. **DLC**—Data on cosmic ray intensity obtained at Huancayo, Peru from Nov. 1939 to Dec

946 were used to calculate the behavior of cosmic radiation intercepted in an ionization chamber at 3350 m elevation on successive days up to 60 days before or after certain selected days (selected because of high cosmic ray incidence). It is shown that there is a strong negative correlation with relative sunspot number, and that the 27-day cosmic radiation wave lags 4-6 days behind the sunspot wave. The author concludes that the 27-day cosmic ray wave cannot be connected with a solar component of cosmic radiation but with a terrestrial magnetic effect induced by the sunspot cycle (based on data from 1936–1944). (*Same item as* 3.8-105, Aug. 1952, *MAB.*) *Subject Headings:* **1. Cosmic radiation 2. Solar activity 3. Huancayo, Peru.**—*M.R.*

**7C–85** 551.521.64

Rose, D. C. (*Natl. Res. Council, Ottawa*), **Cosmic ray research.** *Physics in Canada,* p. 8–11, **1951.** 2 figs **DLC**—Cosmic ray research conducted at present in Canada by Canadian or foreign scientists is reviewed. The individual research projects, including laboratory and field operations, are briefly described, giving name of investigators, place, purpose, method and preliminary results of the research. The particularly favorable position of the Canadian Arctic for cosmic ray research, due to its proximity to the geomagnetic pole, is stressed. Two sample graphs, one showing a cosmic ray "star" and one a sudden increase in cosmic ray intensity in the Canadian Arctic, are presented. The paper's nontechnical language will be appreciated by the average reader. *Subject Headings:* **1. Cosmic ray research 2. Canada.**—*G.T.*

**7C–86** 551.521.64

Rose, D. C., **Meteorological effects on cosmic ray intensity and the meson spectrum.** *Canadian Journal of Physics,* 29(2):97–110, March **1951.** 4 figs., table, 18 refs. **DWB**—The apparatus for continuous recording of the hard component of cosmic rays at Ottawa and at Resolute in the Canadian Arctic and the method of analysis for determining the barometric effect are described. The observations gave a barometric coefficient of −1.75% per cm of mercury for mesons with moments above 350 Mev./c and −2.13% per cm of mercury for those with moments above 630 Mev./c. A theoretical calculation of temperature and barometer effects was made. Calculation of the temperature coefficient did not give results comparable with measurements; calculation of barometric effect showed that measurements of barometer coefficients provide information on the meson spectrum. (*Same item as* 2.9–101, Sept. 1951, *MAB.*) *Subject Headings:* **1. Cosmic ray measurement 2. Meson decay 3. Pressure effects on cosmic rays 4. Ottawa, Canada 5. Resolute, Canadian Arctic.**—*I.L.D.*

**7C–87** 551.521.64:537.59

Rose, D. C., **The sudden increase in cosmic ray intensity, November 19, 1949.** *Canadian Journal of Physics,* 29(3):227–235, May **1951.** 4 figs., table, 11 refs. **DWB**—The cosmic ray counter telescopes set up at Ottawa and Resolute, Canada, are described. The sudden increase in intensity of cosmic rays at Ottawa reached a maximum of 70% above normal in a few minutes and decayed slowly to normal in about four hours. At Resolute the increase was gradual and attained only an increase of 20% above normal; the return to normal took about three hours. It is concluded that the cosmic rays causing the main increase in intensity strike the earth in a narrow cone—which in the Northern Hemisphere crosses North America but does not strike Europe. The smaller effect at Resolute may be explained as the result of a weaker cone or a penumbra effect. (*Same item as* 3.8–106, Aug. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray intensity 2. Cosmic ray variations 3. Cosmic ray instruments 4. Ottawa, Canada 5. Resolute, Canadian Arctic.**—*I.L.D.*

**7C–88** 551.521.64:537.59

Voisin, André G., **On the penetrating showers of cosmic rays.** *Canadian Journal of Physics,* 29(3):205–216, May **1951.** 9 figs., 4 tables, 25 refs. **DWB**—The penetration of particles from local showers produced in lead blocks above counters has been measured in experiments, carried out at sea level, as a function of the angular width of the cone particles. The shower particles are assumed to be mesons. The analyzer counters were connected in coincidence. It was found that showers of particles are more penetrating with increasing width of angular spread and that an average number of 3.7 particles per shower was contained in a cone of half angle of about 15°. (*Same item as* 3.8–109, Aug. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray showers 2. Cosmic ray penetration 3. Meson intensity.**—*I.L.D.*

## 1952

**7C–89** 551.521.64(44)

†Baroni, G.; Cortini, G. (*Rome*); Milone, A.; Scarsi, L. (*Geneva*) and Vanderhaeghe, G. (*Brussels*), **Étude de la composante molle du rayonnement cosmique au Pic du Midi.** [Study of the soft component of cosmic radiation at Pic du Midi.] *Il Nuovo Cimento,* 9th Ser., 9(10):867–885, Oct. **1952.** 6 figs., 6 tables, 28 refs., eqs. **DLC**—This article treats of a study of the soft component of cosmic

radiation at Pic du Midi (43° Lat. N, 2860 m) carried out by means of photographic plates sensitive to minimum ionization. The study is based on a systematic analysis of traces of isolated and traces of pairs of electrons in the emulsion. Differential energy spectra of photons and electrons are determined by measuring the scattering and are normalized according to measured integral intensities; they are compared with spectra calculated by RICHARDS and NORDHEIM according to the cascade theory. Agreement is satisfactory in regard to the form of the spectra as well as in relation to intensity. The angular distributions found for the soft component (photons+electrons) and for the hard component (mesons) nearly agree and can be represented, in first approximation, by a law of the form $I(\theta)d\Omega = I_v \cos 3.5\theta d\Omega$. *Subject Headings:* **1. Cosmic radiation 2. Soft cosmic rays 3. Pic du Midi, France.**—*Authors' abstract.*

**7C–90** 551.521.64:551.506

*Barrett, Paul H.; Bollinger, Lowell M.; Cocconi, Giuseppe et al., **Interpretation of cosmic-ray measurements far underground.** *Reviews of Modern Physics*, Lancaster, Pa., 24(3):133–178, July **1952.** 19 figs., 5 tables, refs., eqs. Also: Barrett, Paul H. and Eisenberg, Yehuda, **Diurnal variations in high energy cosmic ray intensities.** *Physical Review*, New York, 85(4):674–675, Feb. 15, **1952.** 2 figs., 3 refs. **DLC**—A series of measurements was made during the last two years at a depth of 1574 m water equivalent in a salt mine (elevation 134 m, and 594 m underground) near Ithaca, under conditions favorable to the experiments. Description of the counters used and their arrangement is given. The results, presented in many tables and curves, are discussed in detail. The average energy responsible for the penetrating component is estimated, and the mechanism by which the penetrating particles originate is treated mathematically. In direct contradiction to the previous suggested evidence of the nonionizing character of the penetrating cosmic radiation, evidence supporting the $\mu$-meson nature of the cosmic rays at 1600 m.v.e. is presented in this work. The note in **Physical Review** reports one phase of this investigation. *Subject Headings:* **1. Cosmic ray data 2. Cosmic ray ground penetration 3. Cosmic ray diurnal variations 4. Ithaca, N. Y. I. Greisen, Kenneth.**—*W.N.*

**7C–91** 551.521.64

Bassi, P. and Manduchi, C., **Sulla distribuzione zenitale della componente nucleonica di media energia.** [On the zenithal distribution of the average energy of the nucleonic component.] *Il Nuovo Cimento*, 9th Ser., 9(8):722–725, Aug. **1952.** 2 figs., table. English summary p. 725. **DLC**—Authors describe an experiment undertaken in order to measure the zenithal dependence of the middle energy nucleonic component on cosmic ray, using an ionization chamber. Assuming a distribution of the types $\cos^n v$, $n$ results $=1{,}66\pm0{,}33$. *Subject Heading:* **1. Zenith angle distribution of cosmic rays.**—*Authors' abstract.*

**7C–92** 551.521.64

Bongards, Hermann, **Wetterwirksame korpuskulare Sonnenstrahlen.** [Corpuscular solar radiations which affect weather.] *Meteorologische Rundschau*, 5(3/4):66, March/April **1952. DWB**—Argues that a very effective part of the corpuscular radiation from solar eruptions reaches the earth with the velocity of light. *Subject Heading:* **1. Corpuscular radiation.**—*C.E.P.B.*

**7C–93** 551.521.64

Brown, Robert R. (*Dept. of Physics, Univ. of Calif., Berkeley*), **Mean free path of the high energy N component of cosmic radiation.** *Physical Review*, 87(15):999–1002, Sept. 15, **1952.** 3 figs., 2 tables. **DWB**—The mean free path of charged particles that produce penetrating showers has been measured in carbon, sulfur and iron. Preliminary measurements with carbon were carried out at 130 m elevation and the mean free path obtained as $89\pm12$ g/cm$^2$. Measurements at 2765 m elevation gave mean free path in carbon, sulfur and iron of $65\pm5$, $76\pm7$, and $115\pm12$ g/cm$^2$, respectively. The carbon data were used to get an estimate of the mean free path in nuclear matter of high energy. *Subject Heading:* **1. Cosmic ray penetration.**—*Author's abstract.*

**7C–94** 551.521.64

Broxon, J. W. (*Univ. of Colorado, Boulder*), **New barometric and temperature coefficients for the frequency of small cosmic-ray bursts.** *Il Nuovo Cimento*, 9th Ser., 9(11):1054–1070, Nov. **1952.** 3 tables, 13 refs. DLC –This is a continuation of an earlier paper (*Phys. Rev.*, 81(555), **1951**). Records for 3 of the 19 months of the cosmic ray observations primarily considered there, have been reprocessed without satisfactory improvement of results. The statistical treatment of data for an earlier series of observations during 18 months in 1938–9 has been completed with very satisfactory results. For a class of cosmic ray bursts consisting of about 75 to 95 particles in a very heavily shielded high-pressure chamber at an altitude of 5440 ft, the barometric and atmospheric temperature coefficients have been found to be: $-4.58\%$/mm Hg and $-2.53\%$/°C, based on daily average values; and $-9.05\%$/mmHg and $-2.19\%$/°C, based on monthly average values. With

egard to coefficients based on daily average values, the ratio of the barometric coefficient of the adiation producing the small bursts to that of the radiation producing the burst-corrected ionization s about 26, while the corresponding ratio of the temperature coefficients is about 45. Discussion s included regarding the nature of the burst-producing radiation characterized by such large baro- netric and temperature coefficients. *Subject Headings:* **1. Cosmic ray showers 2. Pressure effects on cosmic rays 3. Temperature effects on cosmic rays.**—*Author's abstract.*

**7C–95** 551.521.6/7:523.3

Buettner, Konrad, **Lunar erosion.** *Astronomical Society of the Pacific, San Francisco, Publications,* 64(376):11–14, Feb. **1952.** 6 refs., eqs. **DLC**—Notes on the effects of radiative erosion on the surface of the moon. It is assumed that atmospheric and even temperature erosion is absent but cosmic rays and solar protons, X-rays and UV-radiation reach the moon without disruption by a magnetic field or atmosphere. It is estimated that $3\times10^{16}$ cm$^{-2}$ cosmic ray primaries have struck the moon in its life ($10^9$ years) and that they penetrate 10–20 cm of rock. Effects of eclipses considered quantitatively. LETTAU's recent work cited. (*See* 2.8–76, Aug. 1951, *MAB.*) (*Same item as* 3.11–137, Nov. 1952, *MAB.*) *Subject Headings:* **1. Lunar erosion 2. Cosmic radiation on moon 3. Radiation effects.**—*M.R.*

**7C–96** 551.521.64(946)

Burbury, D. W. P. and McLaren, A. C. (*Tasmania Univ., Australia*), **Cosmic ray asymmetry studies at Hobart, Tasmania.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences,* 5(4):782–784, Dec. **1952.** 2 tables, 7 refs. **MH-BH**—Results of E-W measurements gave the asymmetry of 0.0195±0.0010; N-S asymmetry was 0.0056±0.0013. Correlations with barometric pressure height of an isobaric layer and the mean temperature over a region above the layer did not give significant results. (*Same item as* 4D–279, April 1953, *MAB.*) *Subject Headings:* **1. Cosmic ray asymmetry 2. Hobart, Tasmania.**—*A.A.*

**7C–97** 551.521.64(946)

*Burbury, D. W. P. and Fenton, K. B. (*Univ. of Tasmania, Australia*), **The high latitude east-west asymmetry of cosmic rays.** *Australian Journal of Scientific Research, Ser. A, Physical Sciences,* 5(1):47–58, March **1952.** 2 figs., 7 tables, 18 refs. Also: Burbury, D. W. P., **The high latitude north-south asymmetry of cosmic rays.** *Physical Review,* 86(4):577–578, May 15, **1952.** fig., 2 tables, 2 refs., 6 eqs. **DLC**—Measurements of the East-West and North-South asymmetry of cosmic rays at sea level have been made at Hobart, Tasmania and Macquarie Islands, geomag. lat. 51.7° and 60.7°S. The values obtained have been found to agree satisfactorily with values calculated using a revised form of JOHNSON's theory. Values shown graphically and in tables. *Subject Headings:* **1. Cosmic ray data 2. Cosmic ray asymmetry 3. Hobart, Tasmania 4. Macquarie Islands.**—*Authors' abstract.*

**7C–98** 551.521.64

†Caldirola, P.; Fieschi, R. and Gulmanelli, P., **A phenomenological theory of cosmic radiation in the atmosphere.** *Il Nuovo Cimento,* 9th Ser. 9(1):5–35, Jan. **1952.** 14 figs., 60 refs., eqs. **DLC**—The experimental results on the composition of cosmic radiation at the top of the atmosphere are used to develop a phenomenological theory of all processes which occur in the cosmic radiation while it traverses the atmosphere. We have computed the distribution of the fast nucleonic component (protonic and neutronic), the distribution of the mesonic component and its energy spectrum and positive excess at various altitudes, and the distribution of the electronic component. The latitude effects due to the earth's magnetic field are studied accurately. The theoretical results obtained are discussed, in the light of the most recent experimental data. (*Same item as* 5.6–137, June 1954, *MAB.*) *Subject Headings:* **1. Cosmic ray theories 2. Atmospheric effects on cosmic rays.**—*Authors' abstract.*

**7C–99** 551.521.64:551.543

†Citron, Anselm, **Der Barometereffekt grosser Luftschauer.** [The barometric effect of large cosmic showers.] *Zeitschrift für Naturforschung,* 7a(11):712–721, Nov. **1952.** 5 figs., 4 tables, 32 refs. **DLC**—Several observers have found that the frequency of large cosmic showers decreased with increasing barometric pressure, by around 10%/cm Hg. This was investigated with a row of 5 counters at Freiburg and a nearby mountain station (1250 m), for heavy and light showers (mean density ratio 6.5-1). The mean effect was 7–9% in winter (greatest for heavy showers) and 12% in summer. The causes of these differences are discussed. (*Same item as* 5.6–139, June 1954, *MAB.*) *Subject Headings:* **1. Cosmic ray showers 2. Pressure effects on cosmic rays.**—*C.E.P.B.*

**7C–100** 551.521.64:551.507.321(744)

Clark, Malcolm A. (*M.I.T.*), **The hard component of cosmic rays in the upper atmosphere.** *Physical Review,* 87(1):87–90, July 1, **1952.** 9 figs., table, 12 refs. **DWB**—Describes the balloon

borne equipment used in this study of the charged particles penetrating 20 cm of lead at high altitude above Lexington, Mass. There are two main groups of particles: (1) Those which readily interact on traversing (protons) and (2) those which do not ($\mu$-mesons) and of which the rate of occurrence is a function of atmospheric depth. The experimental results, presented in tables and curves, are analyzed and discussed. *Subject Headings:* **1. Cosmic ray penetration 2. Hard cosmic rays 3. Lexington, Mass.**—*W.N.*

**7C–101** 551.521.64

Cortini, G.; Manfredini, A. and Sergé, G. (*Rome*), **On nuclear explosions produced by primary protons in emulsions exposed in the high atmosphere.** *Il Nuovo Cimento*, 9th Ser., 9(8):659–686, Aug. **1952.** 5 figs., 3 tables, eqs. **DLC**—The analysis of "stars" as produced in Ilford $G_5$, 400$\mu$ emulsion exposed for two hours at about 60 g/cm² (geomagnetic lat. ~47°N) revealed characteristics of events produced solely by primary protons. From these characteristics it is concluded that the plural theory is insufficient to explain the experimental data obtained, and a comparison with other workers' exposures at 3500 m.s.l. suggests a rough scheme of the development of the nucleonic component whose high energy part maintains approximately its spectrum and is absorbed at the length of 110 g/cm². The importance of more extensive experimental data of the same nature as here presented, is stressed. *Subject Heading:* **1. Cosmic ray showers.**—*W.N.*

**7C–102** 551.521.64

**Cosmic rays at geomagnetic zero.** *U. S. Office of Naval Research, Research Reviews*, p. 14–18, Nov. **1952.** illus. **DWB**—Report on cosmic ray measurements carried out under an ONR project near the geomagnetic pole. General Mills plastic balloons were sent up from the icebreaker "Eastwind," carrying three types of equipment: balloon rockets, neutron counters and nuclear emulsion plates. The rockets were fired from balloons at an altitude of five mi and some of them reached 40 mi, telemetering information back to the base. Nuclear emulsion plates were flown up to 90,000 ft but attempts to recover them failed on account of bad weather. Data obtained are being evaluated. Photographs show members of the expedition operating their equipment. *Subject Headings:* **1. Cosmic ray measurement 2. Magnetic poles 3. Upper air soundings.**—*G.T.*

**7C–103** 551.521.64

Critchfield, C. L.; Ney, E. P. and Oleksa, Sophie (*Univ. of Minnesota*), **Soft radiation at balloon altitudes.** *Physical Review*, New York, 85(3):461–467, Feb. 1, **1952.** 4 figs., 3 tables, 10 refs., 28 eqs. **DWB**—Results are given on cloud-chamber observations of electron showers and "spray" events at high altitude (18 mb). The fluxes derived for initiating radiation are consistent with a common origin for showers and "sprays," and thus support the conclusion by Rau and Wightman that "sprays" are showers produced in a single lead plate. However, less than one-fourth as many such events occur as would be expected from observations on mu-mesons if mesons are produced with a spectrum that does not vary with altitude. If all soft radiation at 18 mb were of primary origin, it would constitute less than 0.6 percent of the total cosmic ray flux. *Subject Headings:* **1. Cosmic ray showers 2. Soft cosmic rays.**—*Authors' abstract.*

**7C–104** 551.521.64

Curtiss, L. F. (*Natl. Bur. Standards*) and Gill, P. S. (*Aligarh Univ., Dept. Physics, India*), **The variation of intensity of fast cosmic-ray neutrons with altitude.** *Physical Review*, New York, 85(2):309–312, Jan. 15, **1952.** 2 figs., 3 refs. **DWB**—Using $BF^2$ proportional counters, containing boron in $B^{10}$, imbedded in a paraffin block 15×15×17 in., as a moderator of fast neutrons, the intensity of such neutrons generated in the atmosphere by cosmic rays has been measured at a number of altitudes between 5000 and 13,000 ft above sea level. These locations were all along the same geomagnetic latitude of 20°32′N in Kashmir. The intensity thus measured was found to increase approximately in an exponential manner with decreasing atmospheric pressure under the conditions of the experiments, in general agreement with observations made by other investigators in the atmosphere, giving an attenuation length in the atmosphere of 128 g/cm². *Subject Headings:* **1. Cosmic ray intensity 2. Height distribution of cosmic radiation 3. Kashmir.**—*Authors' abstract.*

**7C–105** 551.521.64(447.8)

Desprez-Rebaud, Simone, **Sur le rapport du nombre de mésons au nombre de particules lourdes enregistrées dans des émulsions nucléaires exposées au Puy-de-Dôme.** [Additional note on the relation of number of mesons to number of heavy particles as recorded from the nuclear emulsion exposures at Puy-de-Dôme.] *Académie des Sciences, Paris, Comptes Rendus*, 235(22):1386–1388, Dec. 1, **1952.** 3 refs. **DWB**—The 131 black traces (earlier reported) were added to the 778 heavy particles and in this way gave 18 mesons per 909 heavy particles or about 2%. *Subject Headings:* **1. Cosmic ray spectrum 2. Puy de Dôme, France.**—*M.R.*

**7C–106** 551.521.64

Dymond, E. G., **Apparent absence of low-energy primary cosmic radiation.** *Nature*, London, 170(4338):1078, Dec. 20, **1952.** 6 refs. **DWB**—A discussion of the lower limit of the energy spectrum of primary cosmic rays, and the difficulties of determining it. *Subject Heading:* **1. Cosmic ray spectrum.**—*C.E.P.B.*

**7C–107** 551.521.64

Eĭdus, L. KH.; Adamovich, M. I.; Ivanovskaia, V. S. et al., **Prostranstvennoe raspredelenie khronikaiushchikh chastic v atmosfernikh livniakh kosmicheskikh luchei.** [Spatial distribution of penetrating particles in cosmic ray atmospheric showers.] *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, Moscow, 22(4):440–447, April **1952. DLC**—By using a counter hodoscope the proportion of penetrating particles was found to increase proportionally to the distance from the shower axis. At sea level the penetrating particles constitute ~10% of the total number of shower particles and account for more than half of the total energy. The percentage of penetrating particles decreases with increase in the total number of shower particles. Arguments are given for the existence of a multiple-core structure. *Subject Heading:* **1. Cosmic ray showers.**—*Physics Abstracts, No. 8297, 1952.*

**7C–108** 551.521.64:551.555.8

El-Wahab, M. Abd; Allegretti, L.; El-Fandi, M. G. and El-Sherbini, M. (*all, Farouk Univ., Alexandria*), **Aumento dell'intensità dei raggi cosmici al livello del mare durante tempeste di sabbia.** [Increased intensity of cosmic rays at sea level during sand storms.] *Il Nuovo Cimento*, 9th Ser., 9(8):734–735, Aug. **1952.** 2 figs. **DLC**—Observations during the sandstorms of March 14–20 and April 17, 18 and 26 showed that the cosmic ray intensity at sea level increased up to 50%. Formation of sand-laden clouds in the atmosphere is directly responsible for the two phenomenon. *Subject Headings:* **1. Cosmic ray intensity 2. Sandstorm effects on cosmic rays.**—*W.N.*

**7C–109** 551.521.64

Escobar V., I. and Harris, Frank B., Jr., **Asimetria de los masones en el ecuador geomagnetico.** [Asymmetry of the mesons at the geomagnetic equator.] *Nimbus*, 3(8/9):31–63, Jan./June **1952.** 17 figs., numerous eqs., 80 refs. **MH-BH**—An apparatus for measuring mesons (consisting of Geiger-Müller counters, a magnetic field of 18,000 Gauss, electronic selectors, electromagnetic recorders and an amplifier system) is described and illustrated. The evaluation of elements supplied by this apparatus is explained in a detailed mathematical treatment. Data obtained at Echo Lake, Colo. and at Chacaltaya, Bolivia are discussed with some preliminary conclusions. The article was also published in a more complete form in Cuaderno, No. 1 of the Laboratory for Cosmic Physics, San Andres Univ., La Paz (*see item* 7D–162, April 1956, *MAB.*) *Subject Headings:* **1. Meson measurement 2. Cosmic ray asymmetry.**—*G.T.*

**7C–110** 551.521.64

Escobar, Vallejo, Ismael, **La radiación cósmica y su origen.** [Cosmic radiation and its origin.] *Nimbus*, 3(10/11):31–40, July/Dec. **1952. DWB**—A summary of the nature of cosmic ray particles, history of research in this field; variations with latitude, longitude, angle of incidence, height, etc., newly discovered particles and origin of radiation (solar, galactic and extragalactic). The author holds to the theory that particles originate in supernova but are accelerated in the magnetic fields of the solar system. *Subject Headings:* **1. Cosmic radiation 2. Cosmic ray origin.**—*M.R.*

**7C–111** 551.521.64:551.510.53:612

Evans, Titus Carr (*Iowa State Univ.*), **A discussion of the potential effects on man of ionizing radiation present in the upper atmosphere.** (In: U. S. School of Aviation Medicine, Randolph Field, Texas, **Physics and medicine of the upper atmosphere.** Albuquerque, **1952.** p. 533–539. 3 tables, 25 refs.) **DLC**—The character of the cosmic radiation in the upper atmosphere which consists predominately of protons is such that the biologic effect per roentgen equivalent is more than 2 to 10 times greater than X-rays, gamma rays or beta particles. Evidence showing that protons, neutrons and other heavily ionizing particles in spite of their small amount are biologically effective in chronic and multiple daily exposures, is reviewed. Tables giving data on mean survival and mean accumulation dose for mice, equivalence of neutrons and X-rays in mice, etc., are included. (*Same item as* 4H–163, Aug. 1954, *MAB.*) *Subject Heading:* **1. Biological effects of cosmic radiation.**—*I.L.D.*

**7C–112** 551.521.64

Green, H. S. and Messel, H. (*both, Univ. of Adelaide, South Australia*), **The lateral spread of cosmic-ray showers in air and lead.** *Physical Review*, New York, 85(4):678–680, Feb. 15, **1952.**

fig., 8 refs., 4 eqs. **DWB**—Results obtained by semiempirical cross sections derived from data on the energy spectrum of nucleons in cosmic radiation are applied in this theoretical investigation of the problem. These theoretical results are presented plotted against atmospheric depths in g/cm². *Subject Heading:* **1. Cosmic ray showers.**—*W.N.*

**7C–113** 551.521.64

Green, H. S. and Messel, H. (*both, Adelaide Univ., South Australia*), **On the theory of the angular and lateral spread of the nucleon component of the cosmic radiation.** *Physical Society, London, Proceedings, Sec. A*, 65(393):689–701, Sept. 1, 1952. 2 figs., refs., eqs. **DLC**—The three-dimensional development of the nucleon component of extensive air showers is investigated. A vectorial diffusion equation is derived for the phase-space distribution of the nucleons, and solved as far as required to determine the mean square angular deviation, and the mean square distance from the shower axis. Account is taken of the variation of density in the atmosphere, and numerical results are obtained for all altitudes. These are exhibited graphically. The lateral spread of the nucleon cascade in lead is also determined, and the results tabulated. A full discussion is given of the significance of the numerical values obtained. *Subject Heading:* **1. Cosmic ray showers.**—*Authors' abstract.*

**7C–114** 551.521.64

Haddara, Sayed R. (*Univ. of Cairo*), **Angular distribution of extensive cosmic ray showers at sea level.** *Mathematical and Physical Society of Egypt, Cairo, Proceedings*, 4(4):137–142, 1952. 3 figs., 7 eqs., 5 refs. **DWB**—Cloud chamber photographs of extensive shower cores were analyzed to study the angular distribution of extensive showers at sea level. A simple theoretical treatment of the distribution is presented. The experimental results were found to be in fair agreement with the theoretical deduction. *Subject Heading:* **1. Cosmic ray showers.**—*Author's abstract.*

**7C–115** 551.521.64

Hazen, Wayne Eskett (*Univ. of Mich., Randall Lab. of Physics*), **Air-shower cores.** *Physical Review*, New York, 85(3):455–461, Feb. 1, 1952. fig., 2 tables, 10 refs., eqs. **DWB**—A cloud chamber 25×80 cm at 3000 m.a.s. was used in this experimental study of density and energy distribution at the cores of air showers. The observations showed (1) that the structure of the axis of air showers is inconsistent with a single initiating ray, and (2) (apparently contradictory) that high energy rays appear to be inconsistent with a high multiplicity of cores. (3) The absolute intensity agrees with ion-chamber and G-M counter measurements. Consistent explanation is yet to be found. *Subject Headings:* **1. Cosmic ray showers 2. Cloud chambers.**—*W.N.*

**7C–116** 551.521.64:539

Hayakawa, S. (*Birkbeck Col., Univ. of London*), **The possible effects of *k*-mesons in the cosmic radiation.** *Physical Society of London, Proceedings*, Sec. A, 65(3):215–219, March 1, 1952. 13 refs. **DWB**—The decay and nuclear interaction schemes of *k*-mesons are discussed. A tentative interpretation is made of some anomalous interactions of penetrating particles observed recently below ground. Further possible experiments testing the hypotheses made are suggested. *Subject Headings:* **1. Cosmic radiation 2. Meson decay 3. *K*-mesons.**—*Author's abstract.*

**7C–117** 551.508.25:551.521.6

Hildebrand, R. H.; Knable, N. and Leith, C. E. (*Univ. of California, Berkeley*), **A γ-ray detector employing multiple scattering separation of electron pairs.** *Review of Scientific Instruments* 23(5):243, May 1952. 2 figs. **DLC**—The γ-ray detector is described and shown in a schematic diagram. Aside from its simplicity, the principle advantage is its good discrimination against neutron and charged particle detection. In terms of an effective area where all γ-rays would be detected, the efficiency of this developed detector is 0.2 cm². *Subject Headings:* **1. Cosmic ray instruments 2. Gamma ray detectors.**—*W.N.*

**7C–118** 551.521.64:551.5

Hodson, A. L. (*Manchester Univ.*), **The altitude variation of penetrating showers.** *Physical Society of London, Proceedings, Sec. A*, 65(393):702–708, Sept. 1, 1952. 2 figs., table, 6 refs. **DLC**—The altitude variations of local penetrating showers and of extensive penetrating showers have been studied between sea level and 33,500 ft. The attenuation length in air of the radiation producing local penetrating showers is found to be (129±2) g/cm². This value has been corrected for the effect of deviations of the radiation from vertical incidence on the apparatus. Local penetrating showers observed under a transition layer of lead 10 cm thick are about 750 times more frequent at 33,500 ft and 500 times more frequent at 30,000 ft than at sea level. *Subject Headings:* **1. Cosmic ray showers 2. Pressure effects on cosmic rays.**—*Author's abstract.*

**7C–119** 551.508.49:551.521.64

**How high? A new altimeter answers the question by "counting" cosmic rays.** *Johns Hopkins Magazine*, Baltimore, 4(1):10, Oct. **1952.** 3 photo. **DLC**—The equipment, the men who produced it (J. W. B. BARGHAUSEN and JAMES A. VAN ALLEN) and a model of the atmosphere from 0-60,000 ft showing relative density of cosmic radiation, are shown in photographs accompanied by brief text. The experiments performed by these two men in balloon, airplane, V-2 and aerobee rocket instrumentation at Johns Hopkins Univ. Laboratory of Applied Physics, lead them to suspect that a more accurate method of determining altitude than by the conventional pressure altimeter could be devised. The cosmic ray energy is recorded on a voltmeter connected to two sets of Geiger tubes. *Subject Headings:* **1. Cosmic ray altimeters. I. Van Allen, James A. II. Barghausen, J. W. B.**—*M.R.*

**7C–120** 551.521.64:621.396.8

Hutchinson, G. W. (*Cavendish Lab., Cambridge*), **On the possible relation of galactic radio noise to cosmic rays.** *Philosophical Magazine*, 7th Ser., 43(343):847–852, Aug. **1952.** 15 refs., 5 eqs. **DWB**—The possibility is considered that cosmic rays are accelerated in regions of the galaxy of intermediate particle density ($\approx 10^9$ cm$^{-3}$). It is found that a conservative estimate of the magnetic fields in such regions would lead to a radio noise flux of the observed order of magnitude, and that the observed spectrum could easily be produced. A possible cause is suggested for the low energy cut-off in the cosmic-ray spectrum. If the proposed mechanism accounts for any large proportion of the cosmic rays, these should be accompanied by a small flux of $\gamma$ quanta which should show the same anisotropy as the galactic radio noise. *Subject Headings:* **1. Cosmic ray origin 2. Radio noise.**—*Author's abstract.*

**7C–121** 551.521.64

†Kaplon, M. F.; Peters, B.; Reynolds, H. L. and Ritson, D. M. (*all, Univ. of Rochester, N. Y.*), **The energy spectrum of primary cosmic radiation.** *Physical Review*, New York, 85(2):295–309, Jan. 15, **1952.** 15 figs., 4 tables, 22 refs., 11 equations. **DWB**—Techniques have been developed by which the energy spectrum of heavy primary nuclei can be measured in the energy range of $10^9$–$10^{11}$ ev/nucleon and of both protons and $\alpha$-particles in the energy range from $10^{11}$ to $10^{13}$ ev/nucleon. It is shown that even the heaviest nuclei in the primary radiation ($Z \sim 26$) have lost their orbital electrons before entering the atmosphere, which supports the assumption that they do not proceed from the solar corona directly to the earth. It is also shown that the velocity spectrum of all primaries of charge $Z > 1$ is independent of the mass of the nuclei, and that it differs only slightly from that of the proton component in the energy interval between $3 \times 10^8$ and $10^{10}$ ev/nucleon. *Subject Headings:* **1. Cosmic ray spectrum 2. Primary cosmic rays.**—*Authors' abstract.*

**7C–122** 551.521.64:537.591.1

*Kocharian, N. M.; Saakian, G. S.; Aĭvazian, M. T. et al., **Issledovanie sostava kosmicheskikh luchei na vysote 1000 m nad urovnem moria.** [A study of the composition of cosmic rays at a height of 1000 m above sea level.] *ZHurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, Moscow, 23(5):523–542, Nov. **1952.** 4 figs., 3 tables, 12 refs., 19 eqs. **DLC**—Using a large magnet with horizontal sets of double trays of crossed counters to define the co-ordinates of 3 points on the path of a particle, and sets of Cu absorbers interspersed with trays of counters to delimit the energy, a study was made of the mass spectrum of mesons and the momentum spectrum of protons. The $\mu^+$, $\mu^-$ meson peaks give masses $(211 \pm 3)m_e$ and $(212 \pm 3)m_e$, respectively. The number of $\pi$'s is $<5\%$ of the $\mu$ flux. The ratio of +ve to −ve particles decreases from 1.24 for momenta (11–35) $\times 10^8$ eV/c to 0.9 for (2–3.6) $\times 10^8$ eV/c. The proton spectrum shows a tail on the high energy side. A theoretical estimate shows that this can be understood in terms of the non-ionizing nuclear collisions which become important at higher energies. A similar estimate is made for $\pi$-mesons. *Subject Headings:* **1. Cosmic ray data. I. Kurakosian, Z. A. II. Kaitmazov, S. D.**—*Physics Abstracts, No. 5550, 1953.*

**7C–123** 551.521.64

Ladenburg, Rudolf (*Princeton Univ.*), **The absorption rate of cosmic-ray neutrons producing $C^{14}$ in the atmosphere.** *Physical Review*, 2nd Ser., 86(1):128, April 1, **1952.** 12 refs. **DWB**—Since ANDERSON and LIBBY's value for the average number of disintegrating carbon atoms (2.23 cm$^2$-sec) agreed approximately with YUAN's average integrated absorption rate of atmospheric neutron, recently found to be nearly twice as large, this brief recalculation was carried out in accordance therewith. *Subject Heading:* **1. Cosmic ray neutrons.**—*W.N.*

**7C–124** 551.521.64 537.59

Setti, R. Levi (*Milan*) and Tomasini, G. (*Geneva*), **Slow heavy mesons from cosmic ray stars.** *Il Nuovo Cimento*, 9(12):1244–1247, Dec. 1, **1952.** 2 figs., table, 8 refs. **DLC**—Two Ilford $G_5$

plates (1200 and 600$\mu$ thick) were exposed at 90,000 ft during balloon ascents from Cagliari in the summer of 1952, and revealed ray stars that are partially represented in photomicrographs. They are discussed separately as event No. 1 and 2 and the results of the measurements are given in a table. By means of the GOLDSCHMITT (et al.) method, the mass of the particle has been accurately determined from scattering range and gap range measurements. The conclusion that "since the primary of star N1 is an $\alpha$ particle, it follows that both mesons have been produced in nuclear nucleus collisions at an energy inferior than 50 GeV" is but tentative. *Subject Headings:* **1. Cosmic ray stars 2. Meson production.**—*W.N.*

**7C–125** 551.521.64

Lovati, A.; Mura, A.; Tagliaferri, G. et al., **A cloud chamber analysis of cosmic rays at 3500 meters, Pt. A, The electronic component from nuclear disintegrations in lead.** *Il Nuovo Cimento*, 9th Ser., 9(10):946–958, Oct. **1952.** 3 figs., 5 tables, 16 refs. **DLC**—A multiple cloud chamber has been operated at mountain altitude, yielding 16,000 photographs of random expansions. This paper is intended to study the production of electronic component in nuclear disintegrations induced in lead by cosmic ray particles of moderately high energy. Assuming the neutral meson hypothesis, the ratio of the numbers of neutral to charged $\pi$-mesons forming in these disintegrations is derived to be $0.42 \pm 40\%$. The probability of production of electron-photon component in nucleon-Pb nucleus collisions is suggestively reported for two energy intervals: the indicative values are about 0.3 and 0.6 times the geometrical cross-section, for incident particle-energies centered, respectively, around 2 and 6 GeV. It is remarked that the results obtained though rather poor statistically, are believed to be unaffected by instrumental selections. *Subject Headings:* **1. Cosmic ray measurement 2. Electron production 3. Cloud chambers.**—*Authors' abstract.*

**7C–126** 551.521.64:551.508.2

Malmfors, K. G., **A simple cosmic-ray-meter, plotting hourly values corrected for pressure.** *Arkiv för Fysik*, Stockholm, 4(25):411–413, **1952.** 2 figs. **DWB**—A novel synchronous apparatus that will produce direct readings of cosmic ray intensity was constructed and tested at the Cosmic Radiation Laboratory at Frescati near Stockholm. Of the almost vertical lines produced on a barograph, the upper ends of the lines will represent the cosmic radiation data corrected for atmospheric pressure since the choice of the rate for the deflection of the barograph's recording pen in accordance with the pressure coefficient. Remote control (cable or radio) of cosmic radiation stations is indicated. *Modus operandi* briefly outlined. *Subject Headings:* **1. Cosmic ray intensity 2. Cosmic ray instruments.**—*W.N.*

**7C–127** 551.521.64:91.04(235.243)

Mather, K. B. (*Univ. of Ceylon, Colombo*), **Cosmic-ray expedition to the Himalayas.** *Nature*, London, 169(4302):616–617, April 12, **1952.** map. Review in *Physics Today*, 6(6):23, June 1953. **DLC**—General information on a cosmic ray expedition to the Garhwal Himalayas in 1951 in which the author participated. The scientific equipment consisted of nuclear-research photographic plates. These were exposed for varying lengths of time (at least 15 days) at various heights up to 18,400 ft. Experiences of the research group are related and the expedition route shown on a map. *Subject Headings:* **1. Cosmic ray expeditions 2. Himalayas.**—*G.T.*

**7C–128** 551.521.6

Mei, J. Y. and Pickup, E. (*both, Physics Div., Natl. Res. Council, Ottawa, Canada*), **Associated pairs of particles in cosmic-ray showers in photographic emulsions.** *Physical Review*, 86(5):796–79 June 1, **1952.** 8 refs. **DWB**—G-emulsion exposures (at 85,000 ft) of 77 showers associated with stars showed more close grouping of tracks than statistically expected. Measurements of two of the pairs indicated that the particles were lighter than protons. Neutral prior decay is a possibility but the occurrence of such pairs in stars is unknown, or it might be short-lived mesons of mass. Insufficient results prevent confirmation. *Subject Heading:* **1. Cosmic ray showers.**—*W.N.*

**7C–129** 551.521.6

Messel, H. and Green, H. S. (*Univ. of Adelaide, S. Australia*), **The angular and lateral distribution for the nucleon component of the cosmic radiation.** *Physical Review*, 2nd Ser., 87(5):738–747, Sept. 1, **1952.** 25 refs., table, 85 eqs. **DLC**—A method, generally applicable in reconstructing the distribution functions when only the moments are known, is developed and demonstrated. Various initial conditions are found, and numerical results of an integral primary proton low spectrum with exponent $\gamma = 1.1$ is presented. Variation of atmospheric density with height is considered. (*Same item as* 5.1–167, Jan. 1954, *MAB.*) *Subject Heading:* **1. Cosmic ray nucleon distribution.**—*W.N.*

**7C–130** 551.521.64

Milone, Carmelo (*Univ. of Catania*), **Sullo spettro di energia degli elettroni degli sciami estesi dei raggi cosmici.** [The energy spectrum of the electrons in extensive cosmic-ray showers.] *Il Nuovo Cimento*, Ser. 9, 9(7):549–571, July **1952.** 9 figs., 1 table, eqs. English summary, p. 571. Short English version in *Physical Review*, 2nd Ser., 84(9):680-681, Aug. 15, **1952. DLC**—The energy spectrum of the electrons, which was measured at sea level at a distance of 0 and 50 m from the core of cosmic ray showers, can be expressed by the relation $N = K(E+E_c)^{-\epsilon}$, where $N$—number of electrons with an energy greater than $E$, $E_c$—critical energy in air, $\epsilon$—depends on the average density and the distance of the electron from the core. The results disagree with the cascade theory. The equipment used is explained and experimental data are given in some detail. *Subject Headings:* **1. Cosmic ray showers 2. Electron spectrum.**—*A.A.*

**7C–131** 551.521.64

Milone, Carmelo (*Catania Univ.*), **Sulle particelle penetranti negli sciami estesi dei raggi cosmici e la fase di sviluppo degli sciami.** [The penetrating particles in extensive cosmic ray showers and the stage of development of $\Delta$ showers.] *Il Nuovo Cimento*, 9th Ser., 9(8):637–641, Aug. **1952.** 1 fig., table. English summary p. 641. **DLC**—The ratio $R$ of penetrating particles in extensive cosmic ray showers has been determined at the sea level as a function of the mean density $\Delta$ of the showers. It is found that the $R$ decreases slowly as $\Delta$ increases. Comparing this result with the results of measurements performed by other authors at 3260 m.a.s.l., it is deduced that the value of $R$ depends on the stage of the development of the showers and increases as this stage increases. *Subject Headings:* **1. Cosmic ray penetration 2. Cosmic ray showers.**—*Author's abstract.*

**7C–132** 551.521.64

Morand, Max; Avignon, Yvette; van Rossum, Lud et al., **Effet de latitude sur l'intensité du rayonnement cosmique determiné au moyen des émulsions nucléaires.** [Determination of latitude effect on the intensity of cosmic radiation by means of nuclear emulsions.] *Académie des Sciences, Paris, Comptes Rendus*, 235(25):1639–1641, Dec. 22, **1952.** refs., 2 eqs. **DWB**—Ilford $G_5$ emulsion plates were exposed under identical conditions at Kebnekaise, 1920 m (65°40′ lat.) and at Mont Ventoux, 1920 m (46°10′ lat.). Analysis of the 3575 tracks, 28 band from Kebnekaise and of the 4374 tracks, 25 band from Mont Ventoux gave a density per cm²/sec of 1.060±0.026. The discussion of the results includes theories of other researchers. *Subject Headings:* **1. Cosmic ray intensity 2. Latitude effects on cosmic rays 3. Kebnekaise, Sweden 4. Mont Ventoux, France. I. Desprez, Roger.**—*W.N.*

**7C–133** 551.521.64

Morand, Max and Tsai, Chu, **Sur la répartition angulaire et la dissymétrie Est-Ouest de l'intensité du rayonnement cosmique, determinées au moyen des émulsions nucléaires.** [On the angular distribution and the east-west dissymmetry of the intensity of cosmic radiation as determined by the average nucleonic emulsion.] *Académie des Sciences, Paris, Comptes Rendus*, 234(19):1875–1877, May 5, **1952.** 2 figs., 4 refs., eq. **DWB**—Brief details of the measurements with a 600 Ilford $G_5$ plate inclosed in a box of fine aluminum and exposed for 53 days at Tamanrasset. 3273 traces were analyzed by dividing the plate into 60 fields uniformly distributed along a band of the plate, and by determining the orientation of the traces and the number of grains for a length of 100$\mu$. The maximum dissymmetry was between 60° and 75°. *Subject Headings:* **1. Cosmic ray intensity 2. Cosmic ray asymmetry 3. Tamanrasset, Algeria.**—*W.N.*

**7C–134** 551.521.64

Morand, Max and Tsai, Chu, **Sur la réparation angulaire, le spectre des moments et la dissymétrie Est-Ouest de la composante nucléaire du rayonnement cosmique étudiée au moyen d'une émulsion sensible.** [On the angular distribution and the spectrum of the moments and East-West dissymmetry of the nuclear component of cosmic rays by means of a sensitive emulsion.] *Académie des Sciences, Paris, Comptes Rendus*, 235(33):1502–1504, Dec. 10, **1952.** foot-refs. **DWB**—Observations on the distribution of the directional intensity of cosmic rays made at Tamanrasset represented by the formula $I = I_0 \cos \lambda\alpha$, where $\lambda = 2.56 \pm 0.28$ where $\alpha < 60°$ and $2.20 \pm 0.34$ when $\alpha$—angle $\beta$. The existence of E-W dissymmetry $= 0.31 \pm 0.11$ when $\alpha$ is between 30° and 45° and $= 0.059 \pm 0.046$ all told is calculated. *Subject Headings:* **1. Cosmic ray intensity 2. Cosmic ray asymmetry 3. Tamanrasset, Algeria.**—*M.R.*

**7C–135** 551.521.64:551.594.12

Ney, Edward P. (*Gen. Mills Aero. Res. Lab., Minneapolis, Minn.*), **Cosmic ray ionization and the methods of measuring it.** (In: U. S. School of Aviation Medicine, Randolph Field, Texas, **Physics and medicine of the upper atmosphere.** Albuquerque, **1952.** p. 471 478. 2 figs., 13 refs.) **DLC**—After a brief theoretical discussion of the physics of detection of ionized particles and

measuring the degree of ionization, the author describes various methods for detecting ionizatio particles. These methods are: photographic emulsions, cloud chambers, ionization chambers and discharge counters, scintillation counters and Čerenkov counters. *Subject Heading:* **1. Cosmic ray measurement.**—*I.L.D.*

**7C–136** 551.521.64:551.507.32

Ney, Edward P., **Heavy elements from space.** *Scientific American*, 184(5):27–30, May 1951 photos., graph. **DLC**—Some general information is given on investigations of primary cosmi radiation through balloons carrying photographic and other equipment to altitudes of 100,000 f or more. Primary cosmic rays are found to be composed of all elements up to about atomic numbe 40, in approximately the same relative abundance as they are found in the sun and large planets Three groups of theories trying to explain the origin of cosmic rays are described: (1) that particle have been roaming in space since the beginning of the universe (2) that particles come from sun or other stars; and (3) that particles are constantly being produced in space. Photos of cosmi ray nuclei tracks and of research equipment are presented. *Subject Headings:* **1. Cosmic ray spectrum 2. Cosmic ray origin.**—*G.T.*

**7C–137** 551.501.9:551.43(794

Pace, Nello and Coo, S. F. (*both, Univ. of California, Berkeley*), **California's laboratory abov the clouds.** *U. S. Office of Naval Research, Research Reviews*, March **1952.** p. 1–7. 3 figs. **DWB**— A research center in the White Mountains, central California, is described. The station was erecte by the Naval Ordnance Test Station, Inyokern, at an altitude of 10,500 ft and is being used fo atmospheric, physical and biological investigations. Research on cosmic radiation, on the relativ purity of air, on temperature, etc. carried on by the California Institute of Technology, under a ONR contract, is reported. Details concerning the station's installations, administrative an supply problems and personnel are given. (*Same item as* 4.5–34, May 1953, *MAB.*) *Subjec Headings:* **1. Mountain observatories 2. Cosmic ray research 3. White Mountains, California** —*G.T.*

**7C–138** 551.521.6

†Pfotzer, G., **Die Neutronenkomponente der Ultrastrahlung.** [The neutron component c cosmic radiation.] *Naturwissenschaften*, Berlin, 39(7):149–158, April 1, **1952.** 11 figs., 2 table 59 refs., eqs. **DWB**—This article summarizes numerous recent researches. Neutron component increase exponentially with height (up to 20 km). Energy spectra extend from 0.4 to $10^7$ eV Other sections discuss retardation and absorption in air, methods of measurement, results in th atmosphere—neutron density, path length, latitude effects and variation of different component with height—"shower" formation and the place of neutrons in the complex of cosmic radiation The absorption and formation of neutrons in the atmosphere is examined, the various measurement fitting a linear relation with height. (*Same item as* 3.8–103, Aug. 1952, *MAB.*) *Subject Heading* **1. Cosmic ray neutrons.**—*C.E.P.B.*

**7C–139** 551.521.6

*†Pomerantz, Martin A. and McClure, Gordon W. (*both, Franklin Inst., Swarthmore, Pa.*), **Th primary cosmic radiation at high latitudes.** *Physical Review*, 86(4):536–545, May 15, **1952.** 7 figs 3 tables, 26 refs. **DWB**—This paper deals with some properties of the new group of low energ particles (E <1.6 Bev for protons) entering top of the atmosphere at geomagnetic latitudes north 52°. The observational data (presented in table and curves) obtained at both 52°N and 69°N ar discussed and certain conclusions are drawn. *Subject Headings:* **1. Cosmic ray spectrum 2. Cosm ray data.**—*W.N.*

**7C–140** 551.521.64:537

Powell, C. F. (*Univ. of Bristol, Eng.*), **Cosmic radiation.** *South African Journal of Scienc* Johannesburg, 48(8):242–243, March **1952.** **DWB**—A brief account of the origin and properti of cosmic rays, and a more detailed sketch on the cosmic ray research carried out at the Universit of Bristol are presented. The method of research at Bristol involves the use of polyethylene balloon proved capable of maintaining regular flight at high altitude and provided with recording equipmen a balloon capable of attaining a height of 115,000 ft is under construction. *Subject Heading* **1. Cosmic ray research 2. Cosmic ray origin 3. Plastic balloons.**—*I.L.D.*

**7C–141** 551.521.6

Riddiford, L. and Butler, S. T. (*both, Univ. of Birmingham*), **The origin of cosmic rays in sola or stellar disturbances.** *Philosophical Magazine*, London, 7th Ser., 43(339):447–456, April 195 fig., 24 refs., 17 eqs. **DWB**—An idealized theory. It is shown that: 1) it seems possible tha particles of cosmic ray energy are obtainable by betatron cyclic acceleration in sunspots; 2) ions w

nerally accelerate in trochoid-like orbits in a magnetic field, constant in space but rising linearly ith time (starspots); 3) with a constant source of particles, the acceleration leads to an inverse ower law. In this case, for the non-relativistic case ($T < 10^9$ ev) the index in the law lies within the nge 1.3–2.0, lower in the relativistic region ($T > 10^9$ ev). No maximum predicted but the power w holds for the highest energy attainable, viz. $10^{13}$ ev for protons and $10^{15}$ ev for heavier particles. he results do not necessarily point to solar origin of cosmic radiation since sunspot-like phenomena ay occur in the other stars. (*Same item as* 5.6-142, June 1954, *M.A.B.*) *Subject Heading:* **. Cosmic ray theories.**—*W.N.*

**7C–142** 551.521.64:551.543(44)

*Rochet, Genevieve and Daudin, Jean, **Sur l'origine des bursts de rayons cosmiques.** [Origin f cosmic raybursts.] *Académie des Sciences, Paris, Comptes Rendus,* 235(19):1121-1123, Nov. 10, 952. table, 3 refs. **DWB**—Bursts of cosmic rays at Bagneses (550 m) and at Pic du Midi 5860 m ere experimentally measured in order to determine the barometric effects, results of which are resented in a table for each month April 1951 to June 1952. *Subject Headings:* **1. Cosmic ray bursts . Pressure effects on cosmic rays 3. France.**—*W.N.*

**7C–143** 551.521.64

Roederer, Juan G., **Über die Absorption der Nukleonenkomponente der kosmischen Strahlung n −21° geomagnetischer Breite.** [On the absorption of the nucleon component of cosmic radiation n −21° geomagnetic latitude.] *Zeitschrift für Naturforschung,* 7a(12):765–771, Dec. **1952.** 7 figs., tables, 8 refs. **DLC**—Photographic measurements of cosmic radiation "stars" (showers) at eights of 2630–5330 m in Tucuman (Argentine) are compared with similar measurements in the Alps (geomagn. lat. 48°). The spectral energy distribution is set out in relation to atmospheric pressure and applied to determine absorption effects in various energy intervals. *Subject Headings:* **1. Cosmic ray showers 2. Cosmic ray spectrum.**—*C.E.P.B.*

**7C–144** 551.521.64

Rose, Donald Charles and Voisin, A. G., **The low energy spectrum of cosmic-ray mesons at sea evel at high geomagnetic latitudes.** *Canadian Journal of Physics,* 30(5):373–387, Sept. **1952.** 3 figs., 17 refs. **DWB**—The results of three different cosmic ray measurements are reported. (1) A simple absorption method was used in the comparison of the energy distribution (below ca. 320 Mev.) of the u—mesons with ranges in lead up to 700 gm/cm² vertical at sea level. This experiment took place during Sept.–Dec. 1950, at Resolute (geomagn. lat. 83.0°N) and during Dec.–March, 1951, at Ottawa (geomagn. lat. 56.8°N). The differential spectrum was derived after various corrections, excluding the barometric since the measurements were so planned as to average out the meteorological corrections. The results, presented in curves, show but insignificant differences in the shape of the spectra between the two latitudes. (2) The differential range spectrum of mesons was measured directly at Ottawa at four points by a coincidence-anticoincidence method. The high value observed at the lowest absorber is difficult to explain. (3) The delayed coincidence method was used because of its value to identify mesons by its decay electron. The results show considerable irregularities over the range of thickness used. The combined results of these experiments are summarized in curves featuring the difference in using different methods of measuring the differential spectrum. The results of (1) agrees with those of (2), and the result of (3) is in agreement with Rossi's curve. *Subject Headings:* **1. Cosmic ray measurement 2. Cosmic ray spectrum 3. Latitude effects on cosmic rays 4. Resolute, Canadian Arctic 5. Ottawa, Canada.** —*W.N.*

**7C–145** 551.521.64

†Rossi, Bruno (*M.I.T.*), **High-energy particles.** New York, Prentice-Hall, **1952.** 569 p. numerous figs., tables, eqs., bibliog. p. 547–561. **DLC**—Includes a substantial chapter on **Nuclear interactions of cosmic rays** (Ch. 8, p. 388–525) in which energy spectra of cosmic rays in the atmosphere are discussed and illustrated. *Subject Headings:* **1. Cosmic ray spectrum 2. High energy particles.**—*G.T.*

**7C–146** 551.521.64:551.594.12:612

†Schaefer, Hermann J. (*Naval Air Station, Pensacola, Fla.*), **The biologic effects of cosmic radiation.** (In: U. S. School of Aviation Medicine, Randolph Field, Texas, **Physics and medicine of the upper atmosphere.** Albuquerque, **1952.** p. 290–315. 7 figs., 3 tables, 26 refs.) **DLC**—An extensive review of the ionization characteristics of heavy nuclei and that of ordinary types of ionizing particles with particular reference to the spatial distribution of the primary ionization in the microscopic structure of biological tissues, radiation effects upon germ and somatic cells, a consideration of the effects produced by comparative ionization dosages from internal radium and from primary

cosmic radiation, and of the properties and biological effects of disintegration stars and air showers. Photographs and diagrams and an extensive bibliography are included. (*Same item as* 4H–164, Aug. 1953, *MAB.*) *Subject Heading:* **1. Biological effects of cosmic radiation.**—*I.L.D.*

**7C–147** 551.586:551.521.64:612:616

Schaefer, Hermann J., **Exposure hazards from cosmic radiation beyond the stratosphere and free space.** *Journal of Aviation Medicine*, 23(4):334–344, 401, 1952. 7 figs., 16 refs. **DSG**—The ionization dosage from cosmic radiation increases from a sea level value of 0.1 milliroentgen-equivalent-physical per 24 hrs to a maximum of 15 mrep/d at 75,000 ft at lat. 58°N. It then decreases and levels off to 9 mrep/d at 140,000 ft. The actual ionization dosage in airplanes or rocket ships is considerably higher owing to transition effects. The principle exposure hazard in the outer regions is provided by the heavy nuclei component due to the extremely high specific ionization of these particles. The so-called then-down part and the ionization peak of the low energy particles are most harmful. Heavy nuclei are characterized by a large radial spread in the ionization peak and then-down part of a nucleus $Z=20$. A human organism exposed to the full heavy nuclei intensity will receive about 100 hits of 15,000 cells per heavy nucleus hit. (*Same item as* 4H–165, Aug 1953, *MAB.*) *Subject Headings:* **1. Biological effects of cosmic radiation 2. Aviation medicine**—*I.L.D.*

**7C–148** 551.521.64:551.508.2

Schein, Marcel and Yngve, Victor H. (*both, Univ. of Chicago, Dept. of Physics*), **The absorption curve of cosmic radiation in the stratosphere.** *Physical Review*, N. Y., 85(4):607–608, Feb. 15, 1952. 2 figs., table, 4 refs. **DWB.** Review in Russian by V——, A., **Krivaia pogloshcheniia kosmicheskikh luchei, poluchennaia v stratosfere.** *Uspekhi Fizicheskikh Nauk*, Moscow, 47(4):628–629, Aug. 1952. 2 figs., 2 refs. **DLC**—A unique balloon-borne apparatus consisting of 17 counters in 8 fourfold coincidences of which six formed telescopes giving simultaneous counting rate through 0, 2, 4, 8, 12 and 18 cm thick lead, was used in this study. Data (table) were obtained at an altitude of 5.7 cm Hg and are compared with sea level data (NIELSEN and MORGAN's) in curves, showing soft component increase by about a factor of 90. The hard component shows an absorption length of about 220 grams per $cm^2$ of Pb. The majority of penetrating particles at 5.7 cm Hg are nucleons. *Subject Headings:* **1. Cosmic ray instruments 2. Cosmic ray data 3. Stratospheric research.**—*W.N.*

**7C–149** 551.521.64:550.385

Sekido, Yataro; Yoshida, Sekiko and Kamiya, Yoshiko (*all, Phys. Inst. Nagoya Univ.*) **Comparison of cosmic-ray storms observed at various longitudes.** *Japan. Science Council Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 6(4):195–209, Dec. 1952. 12 figs., 4 tables, eqs., 18 refs. **DWB**—World-wide records of variations in cosmic ray intensity are analyzed in conjunction with 12 magnetic storms (with sudden commencement) recorded from 1938 to 1950. An interpretation is offered for the marked relationship between magnetic storms and cosmic ray intensity variations. *Subject Headings:* **1. Cosmic ray variations 2. Geomagnetic effects on cosmic rays.**—*G.T.*

**7C–150** 551.521.64:523.72

Simpson, J. A., **The solar component of the cosmic radiations derived from intensity variations.** *International Council of Scientific Unions, Brussels, Mixed Commission for the Study of Solar and Terrestrial Relationships, Rome, Sept. 1952, Proces-Verbal et Communication*, pub. 1953. p. 25–29. 5 figs., 6 refs. **DWB**—The solar component is that part of the primary radiations which has intensity-time variations related to solar phenomena. In the atmosphere only secondary radiation can be observed; the best measure is the nucleonic component. A pile neutron detector is described. Piles were established in geomagnetic latitudes 0, 29, 42, 48 and 52°N. Observations show variation of cosmic ray intensity of 27 days (5%), 24 hr (0–2%), and temporary increases following H$\alpha$ flares. *Subject Headings:* **1. Cosmic ray variations 2. Solar effects on cosmic rays.**—*C.E.P.B.*

**7C–151** 551.521.64:523.7

Simpson, J. A.; Fonger, W. and Wilcox, L. (*all, Univ. of Chicago, Inst. of Nuclear Studies*) **A solar component of the primary cosmic radiation.** *Physical Review*, New York, 85(2):366–368, Jan. 15, 1952. 2 figs., 6 refs. **DWB**—Presents typical samples of the preliminary results of the observations of behavior and changes in intensity of the low primary radiation with time. Successive 12-hr intervals for 3 selected monitor stations are presented. The intensity data from 1951 and 1951 show recurrence of series of maxima, each having about a 27-day period, corresponding to local active regions on the sun. Tentative conclusions are drawn. The experiments will be discussed in detail in a future paper. *Subject Headings:* **1. Cosmic ray intensity 2. Solar effects on cosmic rays.**—*W.N.*

**7C–152** 551.521.64:523.51

Singer, S. F., **Meteorites and cosmic rays.** *Nature*, London, 170(4331):728–729, Nov. 1, 1952. Note by F. A. Paneth p. 729. 16 refs. **DWB**—A discussion of the production of helium in meteorites by cosmic radiation, and its bearing on the determination of the age of meteorites. (*Same item as* 4.5–115, May 1953, *MAB.*) *Subject Headings:* **1. Cosmic ray effects on meteorites.**—*C.E.P.B.*

**7C–153** 551.521.64:551.508.25

Taylor, D. and Abson, W., **Radiation measuring instruments for X-rays to cosmic rays.** *Institution of Electrical Engineers, Proceedings*, Pt. 3, 99(57):28–30, Jan. 1952. 2 figs. **DLC**—General principles of detection processes explained and a short description of a scintillation $\alpha$-counter for liquid samples and a complete $\alpha$-activity monitoring instrument given. X-ray and $\gamma$-rays as well as uncharged particles (neutrons and neutral microns) must produce secondary charged particles before they can be detected by these instruments. *Subject Headings:* **1. Cosmic ray instruments 2. Radiation instruments.**—*A.A.*

**7C–154** 551.521.64

Teucher, M., **Die Absorption der Nukleonenkomponente der kosmischen Strahlung in Luft zwischen Seehöhe und 4000 m.** [The absorption of the nucleon component of cosmic radiation in air between sea level and 4000 m.] *Zeitschrift für Naturforschung*, 7a(1):61–63, Jan. 1952. 2 figs., table. **DLC**—Showers in photographic emulsion were counted at 5 heights from 150 to 3774 m showing increase from 1.3 to 26.6 per day/cm$^3$, related to air density $h$ (gm/cm$^3$) by $N = N_0 e^{-h\sigma l}$. (*Same item as* 3.8–107, Aug. 1952, *MAB.*) *Subject Heading:* **1. Cosmic ray nucleon distribution.**—*C.E.P.B.*

**7C–155** 551.521.64

Ticho, Harold K. (*Univ. of Calif.*), **The absorption mean free path of large hard showers in air.** *Physical Review*, New York, 88(2):236–241, Oct. 15, 1952. 3 figs., 4 tables, 29 refs., 5 eqs. **DWB**—In this report an experiment is described in which altitude curves of hard showers of various sizes produced in a lead block were obtained. The sizes were determined by means of a hodoscope; for the largest hard shower group a minimum energy of 260 Bev was estimated by extrapolation to the top of the atmosphere. All altitude curves show an exponential absorption in the atmosphere with a mean free path of $\sim$125 g cm$^{-2}$. It appears that these large attenuation lengths are difficult to reconcile with a geometric collision mean free path for a nucleon-nucleus collision. *Subject Heading:* **1. Cosmic ray showers.**—*Author's abstract.*

**7C–156** 551.521.64

V——, A., **Variatsii intensivnosti kosmicheskogo izlucheniia sviazannye s deiatel'nost'iu solntsa.** [Intensity variations of cosmic radiations in relation to solar activity.] *Uspekhi Fizicheskikh Nauk*, Moscow, 47(4):629–630, Aug. 1952. foot-ref. **DLC**—Measurements of intensity variations were made simultaneously at 3 stations situated at different latitudes and longitudes (Simpson, Fonger and Wilcox, *Phys. Rev.*, 85:366, 1952, *see* 7C–151). Two mechanisms of the influence of solar activity on the intensity of neutrons are examined. They show that: 1) solar activity changes energy of initial cosmic rays and 2) the sun is the immediate source of a small part of cosmic rays. *Subject Headings:* **1. Solar effects on cosmic rays 2. Cosmic ray intensity.**—*A.M.P.*

**7C–157** 551.521.64:523.7

Van Allen, J. A. and Singer, S. F., **Cosmic rays and the sun's magnetic field: apparent absence of low-energy cosmic ray primaries,** *Nature*, London, 170(4315):62–63, July 12, 1952. table, 10 refs. Also: Singer, S. F., **Diurnal variation of cosmic rays and the sun's magnetic field.** *Ibid.*, p. 63–64, table, 9 refs. **DWB**—The first paper discusses the nature and variation with latitude of the lowest energy cosmic radiation observed by balloon and rocket, and an apparent cut-off ("knee") below geomagnetic lat. 58°. The second paper discusses the possible existence of a diurnal variation of about 2% due to solar magnetic field. (*Same item as* 3.10–164, Oct. 1952, *MAB.*) *Subject Headings:* **1. Cosmic ray intensity 2. Geomagnetic effects on cosmic rays.**—*C.E.P.B.*

**7C–158** 551.521.64

*†Van Allen, James A. (*State Univ., Iowa*), **The nature and intensity of the cosmic radiation.** (In: U. S. School of Aviation Medicine, Randolph Field, Texas, **Physics and medicine of the upper atmosphere.** Albuquerque, **1952.** p. 239–266. figs., tables, refs., eqs.) **DLC**—A summary of the "present state of knowledge of the nature and intensity of the cosmic radiation within the earth's atmosphere and above the atmosphere." The discussion covers the determination of intensities and spectra of each component of cosmic radiation and the measurement of unidirectional total

intensity by means of Geiger-Müller counters; the dependence of cosmic ray intensity at the top of the atmosphere upon geomagnetic latitude; the dependence of cosmic ray ionization upon altitude and upon geomagnetic latitude; the composition of the primary cosmic radiation; the absolute intensity of the cosmic radiation; biological effects of cosmic radiation with regard to radiation dosage, effects of nuclear bursts or "stars" and heavy nuclei; and shielding. Theoretical and experimental data are presented and numerous diagrams and an extensive bibliography are included. *Subject Headings:* **1. Cosmic radiation 2. Cosmic ray intensity.**—*I.L.D.*

**7C–159** 551.521.64

Vernov, S. N.; Kulikov, A. M. and Charakhch'ian, A. N., **Azimutal'naia asimetriia kosmicheskikh luchei v stratosfere na ekvatore.** [Azimuthal asymmetry of cosmic rays in the stratosphere at the equator.] *Akademiia Nauk SSSR, Doklady*, Novaia Ser., 85(3):525–528, July 21, 1952. 2 figs., table, 5 refs. **DLC**—The apparatus especially designed for measuring the azimuthal asymmetry in the stratosphere at the equator by continuous registration of cosmic particles with angles to the vertical from 0° to 90° is described. The results of measurements indicate that (1) a large East-West azimuthal asymmetry showing a positive sign at least for a large portion of primary cosmic rays is observed at equatorial latitudes, (2) the East-West azimuthal asymmetry increases with increasing zenith angle and (3) an East-West oriented asymmetry is practically absent at the equator. *Subject Heading:* **1. Cosmic ray asymmetry.**—*I.L.D.*

**7C–160** 551.521.64

Vidale, Marcello L. (*Univ. of Calif.*), **Intensity of the soft and hard component of the cosmic radiation as a function of altitude at geomagnetic latitudes of 28°N, 41°N, and 55°N.** *Physical Review*, New York, 88(2):266–272, Oct. 15, 1952. 8 figs., 6 tables, 17 refs. **DWB**—Counter telescopes have been flown with plastic balloons to a maximum altitude of 94,000 ft. Intensity vs. pressure curves have been obtained at three geomagnetic latitudes for the total cosmic radiation and for the components capable of traversing several thicknesses of lead. The energy spectrum of primary cosmic ray particles has been derived from the extrapolation of the intensity of the total radiation to the top of the atmosphere. It is concluded that the probability of neutral mesons being produced is comparatively high at primary energies between 4 and 8 Bev. At energies higher than 8 Bev this effect is even more pronounced, due to the contribution of the plural and multiple production of mesons. *Subject Headings:* **1. Cosmic radiation 2. Cosmic ray intensity.**—*From author's abstract.*

**7C–161** 551.521.64

von H——, J., **Was sind V-Teilchen?** [What are V-particles?] *Umschau*, 52(4):106, Feb. 15, 1952. fig. **DLC**—V-particles cause V-shaped traces in photo plates, especially at high levels. Theories and observations are summarized. (*Same item as* 3.8–108, Aug. 1952, *MAB.*) *Subject Heading:* **1. Cosmic radiation.**—*C.E.P.B.*

**7C–162** 551.521.64:523.74

Wada, Masami and Miyazaki, Yukio, **Analysis of the 27-day variation of the cosmic-ray intensities related with sunpots and geomagnetic force.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 6(4):217, Dec. 1952. **DWB**—*Subject Headings:* **1. Sunspot effects on cosmic rays 2. Geomagnetic effects on cosmic rays.**

**7C–163** 551.521.64

Whittemore, W. L. and Shutt, R. P. (*Brookhaven Natl. Lab., Long Island, N. Y.*), **Momentum spectra of cosmic-ray mesons and protons at sea-level and 3.4-km altitude.** *Physical Review*, 86(6):940–946, June 15, 1952. 5 figs., table. **DWB**—Gives (1) data on the momentum spectra (particularly at 3.4 km), (2) information on the production of mesons and spectrum of protons and (3) comparison of the results with earlier works. 1500 meson and proton tracks were measured at sea-level and at 3.4 km altitude. Cloud-chamber method used. *Subject Headings:* **1. Cosmic ray intensity 2. Cosmic ray spectrum.**—*W.N.*

**7C–164** 551.521.64:537.59

York, Carl M., Jr. (*Univ. of Calif.*), **The differential range spectrum of cosmic-ray mesons at sea level.** *Physical Review*, 85(6):998–1003, March 15, 1952. 3 figs., 4 tables. **DLC**—An experimental investigation of the low energy region from 18 g/m² to 76 g/m² air equivalent absorber employing the anticoincidence method and a cloud chamber to discriminate between protons and mesons. The corrections of the data—due to loss of mesons by scattering—were minimized by a geometrical arrangement of the apparatus. The observational results, given in tables and curves, show some discrepancies in earlier work, but agree in so far as the differential range spectrum of protons is concerned. *Subject Headings:* **1. Mesons 2. Cosmic ray spectrum.**—*W.N.*

# SUPPLEMENTARY MATERIAL

**7C–165** 551.521.64

Blackett, P. M. S., **Nature of the penetrating component of cosmic rays.** *Royal Society of London, Proceedings, Ser. A*, 165(920):11–31, March 18, **1928.** 6 figs., 3 tables, 20 refs., 3 eqs. **DLC**—Energy loss of cosmic rays indicates that nearly all rays with $E < 2 \times 10^8$ eV (soft) are electrons, and that the higher energy or penetrating (hard) radiation particles are predominant at sea level. The evidence for various theories as to the cause of this phenomenon is discussed and the first probable explanation given that the particles change mass suddenly during nuclear collisions if their energy falls below a critical value. *Subject Heading:* **1. Cosmic ray energy spectrum.**—*M.R.*

**7C–166** 551.521.64:551.515.4

Schonland, B. F. J., **Thunder-storms and the penetrating radiation.** *Royal Society of London, Proceedings, Ser. A*, 130(812):37 63, Dec. 2, **1930.** 6 figs., 4 tables. **DLC**—An ionization chamber for electroscope was used to make numerous measurements of the penetrating radiation in fine weather and during thunderstorms at Johannesburg. It was found that no significant variations of ionization could be detected in good weather and that an actual decrease in penetrating radiation (runaway electrons) occurred under a thundercloud (rather than an increase due to electric field acceleration as predicted by Wilson). This decrease is attributed to nuclear collisions. The reduction was greatest under storms with excess upper positive charge, suggesting that particles may not be $\beta$ particles but positively charged particles or ultra gamma quanta. *Subject Headings:* **1. Penetrating radiation from thunderstorms 2. Runaway electrons 3. Johannesburg, South Africa.**—*M.R.*

**7C–167** 551.521.64

†Blackett, P. M. S., **Cosmic radiation.** *Royal Meteorological Society, Quarterly Journal*, 59(250):217–230, July **1933.** 3 figs., plate, table, 28 refs. Shorter version in: *Royal Institution of Great Britain, Proceedings*, 28(133):312–327, **1934.** plate, table. **DLC**—The history and results of cosmic ray research are reviewed in chapters on ionization chamber, counter and cloud chamber experiments, time variations of cosmic ray intensity, variation with latitude, the absorption of particles and high energy radiation, and the origin of cosmic rays. The selected references mark the principal discoveries in the cosmic ray field. *Subject Headings:* **1. Cosmic radiation 2. Cosmic ray research 3. Review articles.**—*G.T.*

**7C–168** 551.521.64:551.515.4

Halliday, E. C., **Thunderstorms and the penetrating radiation.** *Cambridge Philosophical Society, Proceedings*, 30(2):206–215, April **1934.** 2 figs., 5 tables, 6 refs. **DLC**—Nearly 300 observations were made between April and Aug. 1933 during 13 thunderstorms at distances up to 40 km to both E and W of the Solar Physics Observatory at Cambridge, England, using a Wilson cloud chamber. Readings were made of tracks of penetrating particles (electrons with energy estimated at $10^2$ eV) obtained during expansions made simultaneously with lightning flashes, and these "coincidences" were correlated with 300 random expansions to see if there was any greater incidence of these particles during thunderstorms (considering direction of storm and direction of approach of particle) than during normal conditions. A significant (10:1 probability) increase was observed when the storm was to the west, and the arrival of the particles was more often from the N, cutting across magnetic field of earth. Indications were that the electrons were accelerated upward by the electrical field of the thundercloud. *Subject Headings:* **1. Penetrating radiation from thunderstorms 2. Beta particles 3. Runaway electrons 4. Cambridge, England.**—*M.R.*

# PART III. REVIEWS OF RECENT IMPORTANT METEOROLOGICAL MATERIAL, AND METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

**Note:** The references to reviews of new books or monographs and the contents of periodicals included in this section are for information only and will not be listed in the monthly indexes until abstracted. When material is furnished in advance of publication, the pagination may be omitted.

## A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

Academia Sinica: **Collected scientific papers, 1919–1949, vol. 1, Meteorology.** (European languag ed.) Peking, 1954. 626 p. bibliogs. Review by S. P. Khromov in *Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia*, 87(4):381–382, July/Aug. 1955.

Akademiia Nauk SSSR. Institut Okeanologii: **Trudy** [Transactions], vol. 10, 1954. 202 p. Price 11 rub. 50 k. Review by S. Iu. Geller in *Akademiia Nauk SSSR, Izvestiia, Ser. Geog.*, No 5:81–83, Sept./Oct. 1955.

Buchinskii, I. E.: **Ocherki klimata Russkoĭ ravniny v istoricheskuiu epokhu** [Outline of climat of the Russian plain during historical time]. Leningrad, Gidrometeoizdat, 1954. 88 p Review by N. N. Gribanov in *Vsesoiuznoe Geograficheskoe Obshchestvo, Izvestiia*, 87(4): 380–38 July/Aug. 1955.

Burton, A. C. and Edholm, O. E.: **Man in a cold environment.** London, Arnold, 1955. 273 p 75 figs., tables. Price, 30 sh. Review by [J. M. Stewart?] in *Royal Meteorological Society Quarterly Journal*, 82(351):119, Jan. 1956.

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